FLIGHT

MAGAZINE

DECEMBER 1954

35 cents

TECHNOLOGY DEPT.

v42 no.6

PUBLIC LIBRARY
DEC 22 1954
DETROIT

4-PLACE BELL MODEL 47J

See Special Helicopter Section starting on page 26

"Fleet Fighters"
Potent Chance Vought F7U-3 Cutlasses stand poised on the flight line, ready for delivery to fighter squadrons of the U. S. Fleet. Outstanding examples of Naval Aviation's new hard-hitting strength, these swift, powerful aircraft are designed to serve as interceptors, fighters or attack planes.
129561

Chance Vought Aircraft INCORPORATED

DALLAS, TEXAS

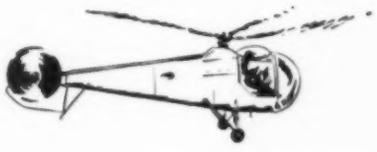
Why do most types of 'copters fly with Lycoming-built engines?

Lycoming-powered Sikorsky S-58 Anti-Submarine 'Copter*

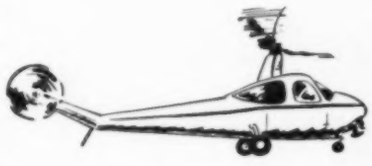
Lycoming-powered Piasecki H-21 Matériel and Troop Transport*

Lycoming-powered Kaman HTK-1 Military Trainer

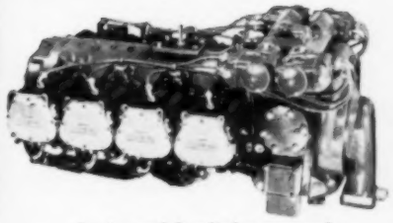
Lycoming-powered Doman L-Z5 General Utility 'Copter



Lycoming-powered Brantly Model B-2 Personal 2-place 'Copter



Lycoming-powered Glenview FlyRide Personal 2-place 'Copter



4-, 6-, and 8-cylinder opposed air-cooled engines.

*7- and 9-cylinder radial air-cooled engines.**

LYCOMING TURBINE ENGINES

Still "under wraps," being developed for the Military. Lycoming's new "pioneers" that promise greater efficiency, greater economy, more brilliant performance than any helicopter engines ever before developed.

*Wright-Cyclone engine, built by Lycoming under license from Curtiss-Wright Corporation, Wright Aeronautical Division.

The answer is simple: Lycoming builds more types of power plants designed for varied types of helicopters than any other engine manufacturer. Some users are shown above.

Since 1940—when Lycoming powered the pioneering Vought-Sikorsky 300—Lycoming has produced engines ranging from 135 to 1500 horsepower. And they have been designed for horizontal, angular, and vertical mounting.

Look to Lycoming for engines that give dependable performance and long life. For further information, write on your letterhead for Lycoming's free booklet titled "Helicopter Power Plants."

FOR RESEARCH • FOR PRECISION PRODUCTION

LOOK TO **Lycoming**

DIVISION OF AVCO STRATFORD, CONN.
Manufacturing plants in Stratford, Conn. and Williamsport, Pa.

Phillips 66
PRESENTS

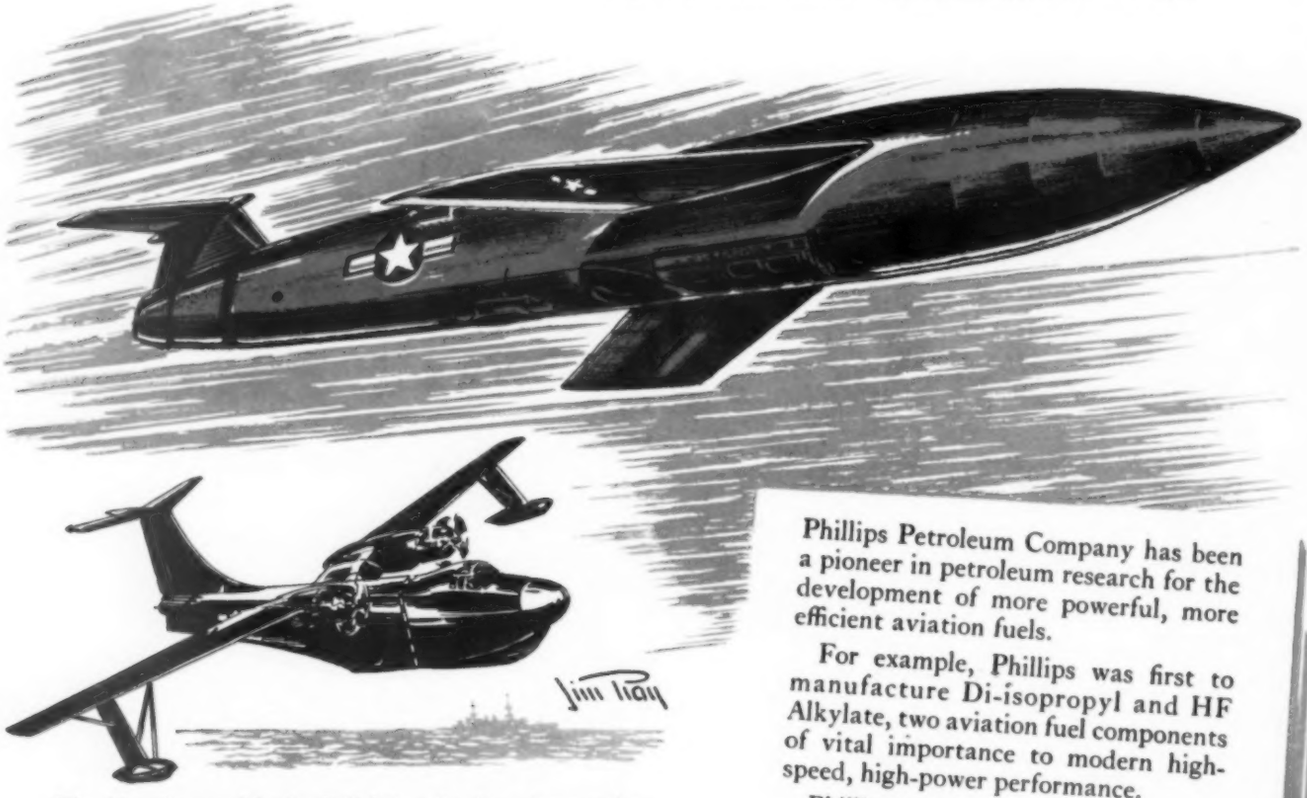
MILESTONES IN AVIATION

From Homemade Plane to Pilotless Bomber

It was on August 1, 1909, that Glenn L. Martin, self-taught flyer, took off at Santa Ana, California, on his first successful flight in the very first Martin airplane—a plane which Martin himself had personally designed and built in an abandoned church which he had rented. From that day on, the name of Glenn L. Martin has been inseparably linked with the progress of American aviation.

Martin milestones in aviation are many. His *China Clipper* flew the first scheduled trans-Pacific flights. His Army and Navy planes pioneered heavy aerial bombardment over land and sea.

Today USAF B-61 Martin *Matadors* make up the first squadrons of pilotless bombers—another milestone in aviation.



The Navy's new Marlin P-5M-2 anti-submarine seaplane is equipped with the latest electronic devices for detecting submarines in all weather. It carries a variety of torpedoes, rockets and mines, and has a tail-mounted gun turret.

Phillips Petroleum Company has been a pioneer in petroleum research for the development of more powerful, more efficient aviation fuels.

For example, Phillips was first to manufacture Di-isopropyl and HF Alkylate, two aviation fuel components of vital importance to modern high-speed, high-power performance.

Phillips produces tremendous quantities of 115/145 grade aviation gasoline for military and commercial use. And today, Phillips also is manufacturing improved fuels for the latest designs in turbo-props and jets.

Operators know they can rely on Phillips *66* aviation fuels and lubricants.

AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

Phillips 66

AVIATION PRODUCTS

AIR Report

Significant Trends and News

CESSNA HAS DELIVERED 17 MODEL 310 TWINS and orders on hand will carry production through August, 1955. Production will be accelerated early next year, reaching a rate of 1 each working day next March.

PIPER HAS ALREADY REACHED ONE-A-DAY PRODUCTION with its twin-engine Apache.

LOW-WING, ALL-METAL 4-PLACE DESIGN has challenged Piper engineers for several years but they now have one which they expect to produce within two years, perhaps by early 1956. It will be called the "Comanche" and will be in the low-priced category represented by the new 4-place Mooney Mark Twenty, which enters production early in 1955.

A NEW SINGLE-AXIS (DIRECTIONAL CONTROL ONLY) AUTOPILOT was demonstrated for the first time by Globe Industries of Dayton, Ohio, last month at the annual Aviation Distributors and Manufacturers Association meeting in Washington. Utilizing a rate gyro and small servo motor, yaw disturbance is detected and rudder correction is made within .06 of a second. Rate of correction is in direct proportion to amount of yaw disturbance. Now installed in the firm's Cessna 170, the mechanism is described as permitting cross-country flight by using only the throttle and elevator trim. The single instrument on the panel contains an on-off switch, two flashing lights indicating direction of yaw correction, and a small trim dial. First production versions are due next March, priced in the $500 to $600 range. Total installed weight will be under 8 lbs. with installation in 2 to 4 hrs.

HIGHER EXECUTIVE DC-3 CRUISING SPEEDS are reported by Executive Aircraft Service at Dallas for a Tecon Corporation conversion using modified Wright R1820-72MI engines and paddle props. Pilot Harry Mitchell said he is indicating 190 mph. at 7,000 ft. on 680 hp. from each engine. These engines incorporate a 16-9 nose section, new engine mounts and short stacks, according to L. V. Emery of Executive Aircraft Service.

WIDER CLEARANCE ON TOP AND HORIZONTALLY FROM CLOUDS is currently required by a change in Section 60.30 of Part 60 of the Civil Air Regulations prescribing visual flight rules. Increased speed and rate of climb of pressurized aircraft caused the change. New rule provides that aircraft shall not be flown less than 1,000 ft. vertically from clouds on top or less than 2,000 ft. horizontally from clouds and not less than 500 ft. vertically from clouds underneath.

INTERNATIONAL AIRLINES ARE COPYING EXECUTIVE TRANSPORT CABIN INTERIORS in an effort to offer plushier first-class accommodations in contrast to tourist or coach facilities. Sabena Belgian Airlines, for example, is re-working first-class DC-6B transoceanic cabin sections to provide over-size swivel chairs, table groupings and over-all cabin spaciousness on the order of that attained by executive conversion centers in DC-3's and Convair 340's

DE HAVILLAND IS NOW EXPECTED TO INTENSIFY COMET 2 AND 3 SALES with the tag-line "world's most thoroughly-tested jet airliner" as result of recently-concluded and lengthy Comet accident investigation. Pressurized cabin failure from fatigue around ADF hatch was determined as the Cause of Comet 1 tragedies which grounded all Comets pending exhaustive testing and re-

---

FLIGHT MAGAZINE

Including SOUTHERN FLIGHT and MODERN AIRPORTS

DECEMBER, 1954 VOL. 42, No. 6

COVER: For our Third Annual Helicopter Issue, this month's cover pictures the new 4-place Bell Model 47J, powered by a 6-cylinder 260-hp. Lycoming engine. This engine is derated to deliver 220 hp. For details, see page 28. Bell has also developed a new 3-place Model 47H powered by an improved Franklin 200-hp. engine. Executive versions of both are being widely demonstrated. CAA certification is expected early in 1955.

—(Bell Photo.)

Air Report—SIGNIFICANT TRENDS AND NEWS 5

Just Among Ourselves—EDITORIALS—ROTARY WINGS AT THE CROSSROADS; "C. R." ON LOCAL AIR SERVICE; FOREIGN DELIVERY FLIGHTS 15

Helicopter Progress—OUR THIRD ANNUAL REPORT ON HELICOPTER UTILIZATION, DESIGN AND DEVELOPMENT . . . 26

Copter Airline Outlook—BY A. V. J. VERNIEUWE—AN OPERATOR LOOKS AT TRANSPORT REQUIREMENTS 30

Cessna CH-1 Project—DEVELOPMENTAL STAGES IN PHOTOS . . 31

First CAA-Approved Ram Jet—HILLER'S 12-LB. ENGINE DELIVERS 45 POUNDS OF THRUST 32

Tip-Shaped Ram Jet—A POWER BOOST ENGINE TO AID TAKE-OFF AND HOVERING 33

Franklin With Turbosupercharger—HIGHLY EFFICIENT 300-HP. ENGINE FOR HELICOPTERS AND LIGHTPLANES 34

Decca Navigation for Copters—BENDIX WILL PRODUCE NEW DEVICE FOR PRECISE LOW-LEVEL NAVIGATION IN WEATHER . . 35

Biggest NBAA Display—REPORT ON AVIATION'S GREATEST GATHERING OF BUSINESS PLANES 38

Commander Spray Kit—THE KING OF YEMEN GETS A DUAL-PURPOSE PLANE 44

Blast That Carbon—BY GEORGE E. HADDAWAY—PORTABLE AIR CLEANER IMPROVES ENGINE POWER AND SMOOTHNESS . . . 46

New Cessna 170—SEVERAL CHANGES IMPROVE THE 1955 MODEL . 48

Fiberglas Taylorcraft—MOLDED COVERINGS REPLACE DOPED FABRIC 50

Airmen's Calendar—COMING EVENTS 62

Questions and Answers for Airport Operators 64

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager, P. O. Box 750 (1901 McKinney Ave.), Dallas, Texas—Telephone STerling 2125.

FLIGHT MAGAZINE, December, 1954, Vol. 42, No. 6. Published monthly. Publication office, P. O. Box 750 (1901 McKinney Ave.), Dallas 1, Texas. Price 35c single copy. Subscription rates: United States, one year, $3.00; two years, $4.00; three years, $5.00. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, under the act of March 3, 1879.

Copyright, 1954, by Air Review Publishing Corporation.

MESSAGE TO AN ENGINEER THINKING ABOUT THE FUTURE— HIS FUTURE

Take a few moments now to review the progress of your career. Does your present position offer you a future that fully utilizes your creative abilities?

Compare your present assignment with the diversified, stimulating pursuits that increase the inventive challenge of Fairchild's team of qualified engineers. These men are working on engineering advances for the famous C-119 Flying Boxcar and the soon-to-be-produced C-123 Assault Transport. More than that, they are developing tomorrow's jet fighters . . . special reconnaisance aircraft . . . jet bombers and transports. The men at Fairchild know that *planned* project diversification keeps them in the forefront of the field of aerodynamics.

Gracious country living only minutes away from urban Baltimore or Washington . . . paid pension plan . . . an excellent salary with paid vacations . . . ideal working environment . . . generous health, hospitalization and life insurance . . . and the many other benefits of a progressive company add to the pleasure of working with Fairchild.

You'll be investing wisely in a secure future if you take time today to write to Walter Tydon, Chief Engineer, outlining your qualifications. Your correspondence will be kept in strict confidence, of course.

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
HAGERSTOWN, MARYLAND

NEW NATA PRESIDENT is Oscar Hostetter (left), operator of the York (Pennsylvania) airport. He is shown with NATA retiring president, Frank Shelton of Anderson Aviation, Phoenix, Arizona. Other new officers, elected at last month's annual NATA convention in Miami, include: Tom Ferguson, Albany, Ga., eastern vice president; King Cruse, Houston, western vice president; J. D. Finger, Armonk, N. Y., treasurer, and Charles A. Parker, executive director. Regional officers are Galen Bertram, Greensburg, Kansas; Homer Holman, Great Falls, Mont.; E. R. Dawson, Allentown, Pa.; Arthur Templeton, Atlanta; Gordon Newstrom, Grand Rapids; William Pierce, Houston, and Donald Ottosen, Phoenix.

search. De Havilland and Comet operators were held blameless in view of the pioneering involved and the state of the art when the Comets were built to meet or exceed existing airworthiness standards. Re-working of already-produced Comet 2 and 3 airliners to conform with new and higher standards is not expected to affect design performance, due to power plant progress, but it is doubtful that grounded Comet 1 airliners will be reworked.

SIX-MILLION-DOLLAR BACK-

JETTISONABLE ROCKET ASSIST MOTOR, the new de Havilland Super Sprite, is shown dropping by parachute from an airplane which used its boost power for takeoff. It is retrieved for repeated use.
—(British Information Services Photo.)

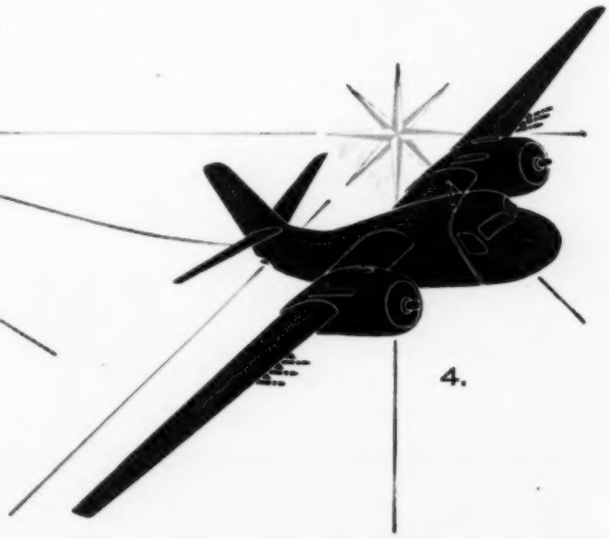
JOIN THE NAVY AND FLY THE WORLD

To make you a highly skilled Naval aviator, the United States Navy will give you education and training worth $64,000. To give you the finest aircraft, the Navy has over the last 25 years selected designers and builders like Grumman. For a career in the Navy, ask any recruiting officer about the NAVCAD program.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION

BETHPAGE • LONG ISLAND • NEW YORK

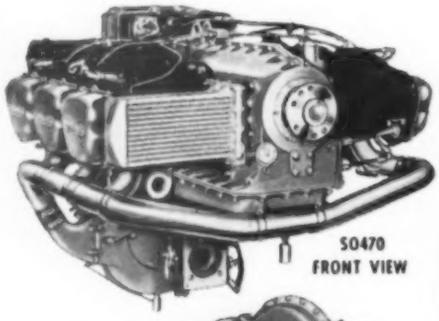
DESIGNERS AND BUILDERS OF (1) SUPERSONIC TIGER, (2) COUGAR II, (3) ALBATROSS AMPHIBIAN, (4) S2F SUB-KILLER, METAL BOATS, AND AEROBILT TRUCK BODIES.



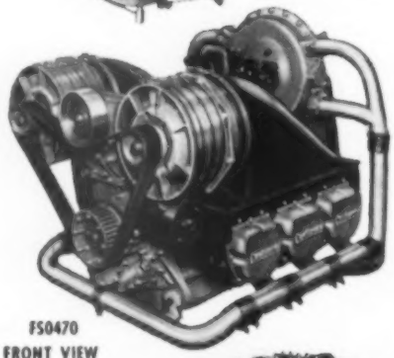
more power... ...better power

... TOMORROW'S POWER TODAY

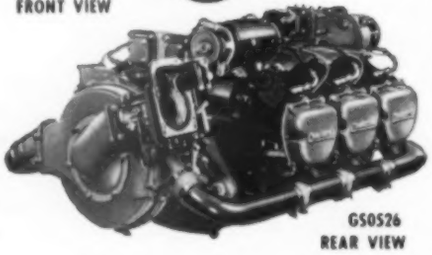
Here are three more reasons why tomorrow's finest aircraft, like today's, will fly with Continental power. Two of them represent further developments of the famous 0470 series —one supercharged, the other supercharged and fan-cooled expressly for helicopter use—while the third is a brand new power plant, engineered and built with the needs of multi-engine utility planes in mind. They have one thing in common: as products of the pioneer in power for utility aircraft, all three rate high in those qualities which go to make up dependability—qualities which have made Continental engines fliers' undisputed first choice.



S0470
FRONT VIEW



FS0470
FRONT VIEW



GS0526
REAR VIEW

GENERAL SPECIFICATIONS

	S0470	FS0470	GS0526
Horsepower	250	260	290
R.P.M.	2600	3000	3000
Alt. (ft.)	10,000	10,000	15,000
T.O. Power (Sea Level)	265	260	320
Length (in.)	37.73	39.64	52.28
Height (in.)	30.77	34.81	23.96
Width (in.)	33.62	33.62	34.68
Bore (in.)	5.00	5.00	5.125
Stroke (in.)	4.00	4.00	4.25
Displ. (cu. in.)	471	471	526
Comp. Ratio	6.0:1	6.0:1	6.0:1
Total Dry Wt. with Accessories (lbs.)	512	550	578
Type of Prop. Drive	Direct	Direct	Geared .688:1
Recom. Fuel Octane	91/96	91/96	91/96
Supercharger Ratio	12.45:1	10.13:1	12.0:1
Supercharger Drive	Belt	Belt	Gear

Powers the Nation
CONTINENTAL MOTORS
AMERICA'S STANDARD ®

ONLY CONTINENTAL BACKS YOU WITH ESTABLISHED WORLD-WIDE SERVICE

Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN

LOG of firm orders with deposits for new twin-engine Apaches, Tri-Pacers, Super Cubs and PA-18-A agricultural planes was reported at last month's 15th annual Piper Aircraft distributor convention in Lock Haven, Pa. Distributors took 76 new Pipers home from the meeting. One of the deliveries was to Jonas Aircraft and Arms Co., Inc., of New York, which arranged for Transoceanic Pilot Max Conrad to fly it nonstop from New York to Paris for delivery there. He arrived safely after a spectacular solo flight of 22 hrs. 23 mins.

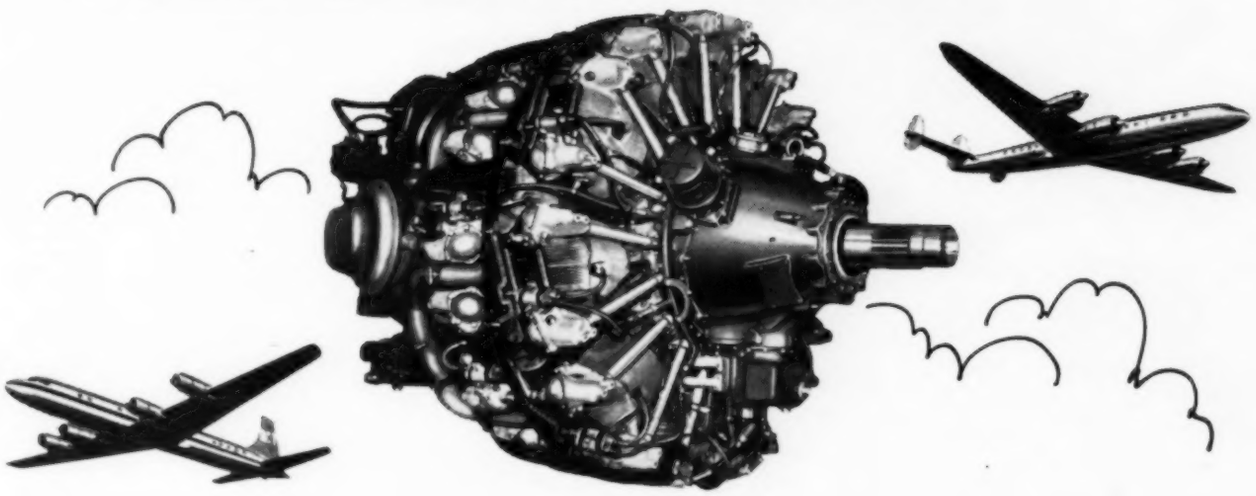
LEADING PIPER DISTRIBUTORS IN 1954 SALES have been ranked by the factory in the following order: 1. Baker Aircraft Sales, Long Beach, Calif. 2. A. W. Whitaker, Portland, Oregon. 3. Safair Flying Service, Teterboro, N. J. 4. Tufts-Edgcumbe, Elmhurst, Ill. 5. Piedmont Aviation, Winston-Salem, N. C. 6. Mountain States Aviation, Denver. 7. Des Moines Flying Service, Des Moines. 8. Ken-Mar Airpark, Wichita. 9. Anderson Aviation, Phoenix. 10. Wes-Tex Aircraft Sales, Lubbock.

A 3-AXIS JAVELIN AUTOPILOT is being developed by Javelin Aircraft Company at Wichita. The firm has already delivered some 300 Javelin single-axis autopilots. Its 3-axis device will be completely hydraulic in operation, will weigh 35 pounds and is expected to operate more than 2,000 hrs. without maintenance. A sales price of $995 plus $295 installation kit is hoped for. Dave Blanton, president and chief engineer, said production is not expected for at least a year, however.

BELL AIRCRAFT'S VERTICAL TAKE-OFF JET PROTOTYPE has been successfully flight-tested with two Fairchild J44 jets producing 1,000 lbs. of thrust each. Exhaust is directed downward for vertical take-off or landing and rearward for forward flight. It resembles a light airplane

FOURTH VERSION OF MARTIN B-57 light bomber in production is a transition trainer. Uses will include night instrument flying, giving piston-engine pilots jet experience and giving fighter pilots multi-jet know-how. Trainer will be B-57C version. Three B-57's are shown in flight. —(Martin Aircraft Photo.)

27 World Airlines Choose the PROFIT POWER of the TURBO COMPOUND



16.39¢ per revenue ton mile!

Day-in, day-out operation under every condition is proving the Curtiss-Wright Turbo Compound engine to be a real money-maker for the airlines. Its greater profit power, like its greater horsepower, stems from harnessing exhaust gases to give it 20% more output or 20% more range than any other engine of its type.

In the world's fastest long-range transports, the Douglas DC-7 and the Lockheed Super Constellation, the Turbo Compound reduces direct operating costs, exclusive of depreciation, to 16.39¢ per revenue ton mile* – lowest of any modern transports.

And these operating costs will go still lower! Current maintenance costs for this still relatively new engine type account for 3.30¢ per revenue ton mile. As experience and time are built up in engine maintenance routines, this figure will fall, providing still greater savings to airline operators.

*Based on actual U.S. airline domestic operations for the first 6 months of 1954. Depreciation has been excluded because of wide variations in airline depreciation rate policies.

Turbo **C**ompounds = greater **T**onnage at lower **C**ost

CURTISS-WRIGHT
CORPORATION . WOOD-RIDGE, N. J.

World's Finest Aircraft Engines

Curtiss-Wright extends its appreciation to these major airlines, whose selection of the Turbo Compound has opened a new era of economical, high-speed transportation around the world:

AIR FRANCE
AIR-INDIA INTERNATIONAL
AMERICAN AIRLINES
AVIANCA—COLOMBIAN NATIONAL AIRWAYS
CUBANA—CIA. CUBANA DE AVIACION, S.A.
DELTA-C&S AIR LINES
DEUTSCHE LUFTHANSA
EASTERN AIR LINES
IBERIA—AIRLINES OF SPAIN
KLM—ROYAL DUTCH AIRLINES
LINEA AEROPOSTAL VENEZOLANA
NATIONAL AIRLINES
NORTHWEST ORIENT AIRLINES
PAKISTAN INTERNATIONAL AIRLINES
PANAGRA—PAN AMERICAN-GRACE AIRWAYS
PAN AMERICAN WORLD AIRWAYS
QANTAS EMPIRE AIRWAYS LTD.
S-A-S—SCANDINAVIAN AIRLINES SYSTEM
SEABOARD & WESTERN AIRLINES
SOUTH AFRICAN AIRWAYS
SWISSAIR
THAI AIRWAYS COMPANY, LTD.
TRANS-CANADA AIR LINES
TRANSPORTES AEREOS PORTUGUESES
TRANS WORLD AIRLINES
UNITED AIR LINES
"VARIG" BRAZIL

UNLIMITED UTILITY

For specialized or routine work, Bell helicopters average savings of 50% and more in time, money and manpower for industry, agriculture and government agencies.

Able to operate over land and water and in any climate, the Bell helicopter has a low initial cost, *lowest* maintenance cost—and does all jobs, faster and safer in all kinds of weather.

Engineered and produced by the world's leading commercial helicopter manufacturer, the economy and dependability of Bell helicopters have been thoroughly proved by a million flight hours all over the world.

In agriculture, survey, power line patrol, airmail, construction, insect control, personnel and cargo transportation, military uses and other operations, Bell helicopters are the most versatile of all machines.

Put the experience of hundreds of successful world-wide users to work for you. Let us help analyze your problems.

Write or wire:

SURVEY

INSECT CONTROL

AIRMAIL

LINE PATROL

FARMING

CONSTRUCTION

Texas Division

BELL Aircraft CORPORATION

P. O. Box 482
Fort Worth 1, Texas

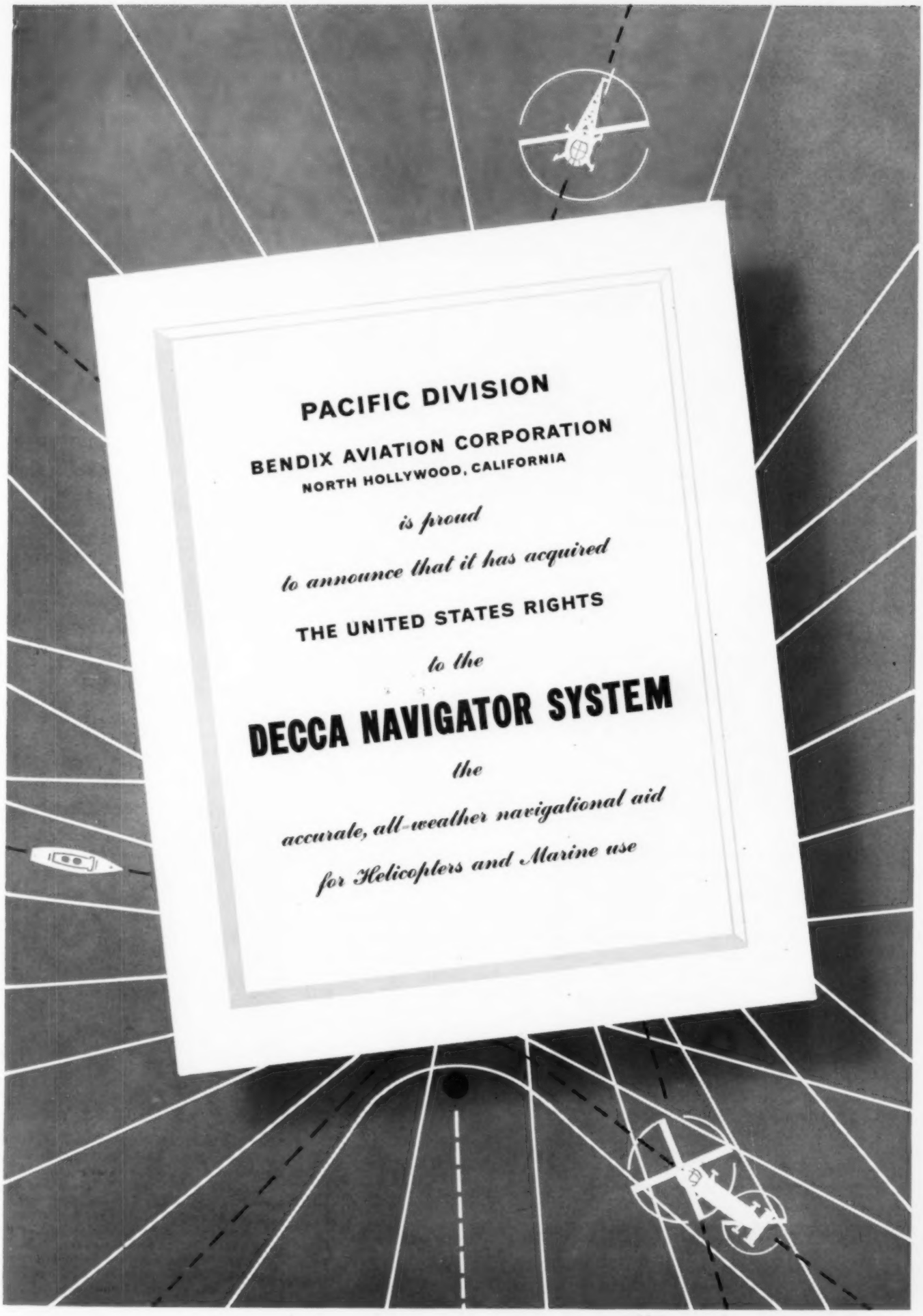
Sales and service representatives in 60 countries

in configuration but can hover and maneuver from side to side while hovering.

SURVEY OF OWNERS OF PIPER AIRPLANES reveals many interesting aircraft merchandising and equipment facts. Piper Sales Manager J. W. Miller reports that 97% of Tri-Pacer owners in 1954 reported using planes in their business averaging 320 hrs. or almost 40,000 miles per year. Eighty-five per cent of these owners now have omni radios as against 17% in 1951, and 74% have full instrument panels as compared with only 8% in 1951. Twenty-three per cent report their Tri-Pacer was the first plane they have owned and 55% were previous Piper owners. For 1954, owners reported Tri-Pacer performance averaged 119 mph. for block-to-block speed at 2,375 rpm., consuming an average of 8.1 gals. of fuel per hour. Tri-Pacer buyers by category are manufacturers 27.5%, farmers and ranchers 18.2%, wholesalers-distributors 15.8%, construction companies 12.2%, physicians 9.2%, engineers and architects 6.2% and miscellaneous 10.9%.

A $400,000 EXPANSION PROGRAM for the Terrell (Texas) plant of the Van der Horst Corporation, 30 miles east of Dallas, has been announced. The plant specializes in its channel-type "Porus-Krome" plating of worn engine cylinders. Increasing demand for the plating by aircraft operators necessitated the expansion, which will triple the Texas plant's productive capacity. The firm operates other plants at Olean, N. Y., and Hilversum and Zwolle in the Nether-

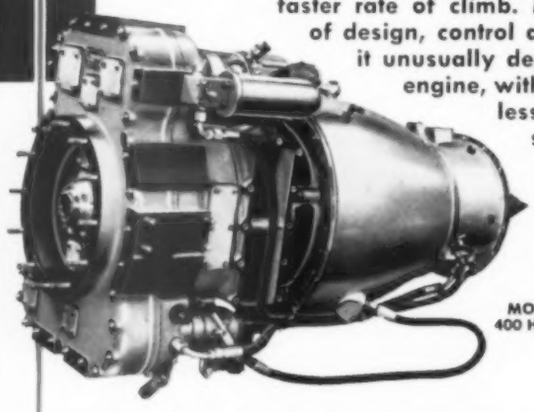
SMALL JET ENGINES are being shipped in this scene from Fairchild Engine Division at Farmingdale, New York, to Ryan Aeronautical Company for installation in U. S. Navy Firebee target drones. Engines are newly-improved Fairchild J44-R-20 turbo jets weighing about 300 lbs. but producing about 1,000 lbs. of thrust. Diameter is only 22 inches, length 72 inches. Fairchild has produced them since 1951. —(Fairchild Photo.)


PACIFIC DIVISION
BENDIX AVIATION CORPORATION
NORTH HOLLYWOOD, CALIFORNIA
is proud
to announce that it has acquired
THE UNITED STATES RIGHTS
to the
DECCA NAVIGATOR SYSTEM
the
accurate, all-weather navigational aid
for Helicopters and Marine use

Fastest Helicopter

...Turbine-powered by C.A.E.

SIKORSKY'S XH-39 is notable for high performance—increased cruising speed, improved hovering ability, and faster rate of climb. Moreover, its simplicity of design, control and maintenance makes it unusually dependable. Although the engine, with all accessories, weighs less than 250 pounds, the ship accommodates up to 800 pounds of cargo. Payload space, in addition to pilot, is 81 cubic feet.



MODEL 220 C.A.E.
400 H. P. FIXED SHAFT
TURBINE

Latest in a steadily-lengthening list of applications in which C. A. E. gas turbines are performing with distinction is this advanced helicopter, the Sikorsky XH-39. It is powered by the 400-h.p. C. A. E. Model 220 fixed shaft turbine, and holds the world's record for helicopter speed—156.005 m. p. h. A companion model developing 280 h. p. gives exceptional performance to the latest turboprop fixed-wing plane. . . . Two other C. A. E. turbine models—the J69 turbojet and the TC-104 air generator—also are making good on important assignments. The former, powering the Cessna T-37 twin jet trainer and the Ryan Q-2 Firebee target drone, has future promise, too, as auxiliary power for large planes. The latter is the nucleus of the MA-1 portable starter unit for large military jets, and is already in production at C. A. E.

LOOK AHEAD—JOIN AIR FORCE

CONTINENTAL AVIATION & ENGINEERING CORPORATION
12700 KERCHEVAL AVENUE, DETROIT 15, MICHIGAN
SUBSIDIARY OF CONTINENTAL MOTORS CORPORATION

lands, and licenses the Spar-Tan Engineering Corp. at Los Angeles to use its process.

NEW ALL-METAL FIXED-PITCH PROPELLER has been developed by Sensenich Corp. for engines of 125-165 hp. and using a new high-speed airfoil section. Diameter is 74 ins., weight 29.5 lbs. and price $230.

COLLINS RADIO AIRBORNE OMNI EQUIPMENT has been purchased by Trans-Texas Airways for its fleet of 16 DC-3's and by Central Airlines for its 9 DC-3's. Central's purchase was for dual VOR's and for new Collins communications equipment.

A NEW LEAR PICTORIAL ATTITUDE SYSTEM has been ordered in quantity for installation in the Navy's new all-weather F3-H Demon produced by McDonnell Aircraft. The new indicator visually simulates the horizon in relation to the aircraft's attitude, with 5-degree horizontal separations indicating airplane attitudes up to 85 degrees of climb or dive. Exact bank angles can similarly be read on a semi-circular scale. The device uses an electrical pitch trim which allows the pilot to electrically "zero" the indicator to any selected non-level attitude.

A NEW AGRICULTURAL MODEL 325 will be announced by Cessna Aircraft for delivery late in 1955 which it believes will spread 25 to 30 per cent more dust or spray than a 450 Stearman. It will be a utility version of the 225-hp. L-19 Bird Dog incorporating numerous changes and will

(Continued on page 70)

PORCELAIN ENAMEL "sandwich" panels, consisting of a porcelain-enamel face, aluminum honeycomb core and galvanized steel backing, are used in large volume on new structures of the San Francisco International Airport. Called "Seaporclad" and produced by Seaporcel Metals, Inc., Long Island City, N. Y., the panels are 2 ft. 9 ins. high, 5 ft. 10 ins. wide and 9 ins. thick. San Francisco airport buildings utilize 100,000 sq. ft. of the material for exterior and interior walls.

MAGNOLIA PETROLEUM COMPANY

Happy

MOODBEAMS #1

Mary Locklier is happy — and we're ALL happy — about the major role Southwest Airmotive was privileged to play in planning and staging the National Business Aircraft Association's epochal 1954 convention. With others from throughout the land, we had a hand in shaping real aviation history in keeping with a 22-year-old SAC tradition of supporting worthy industry projects. Keep your eyes on NBAA. If, meantime, they stray to our Mary, she's 25, 110 lbs., 5'2", with green eyes, brown hair. And, say there —

HAPPY CHRISTMAS and '55!

Southwest Airmotive
COMPANY
LOVE FIELD ☆ DALLAS

Just among ourselves

EDITORIALS

ROTARY WINGS AT THE CROSSROADS

LARRY Bell, writing in these columns a year ago, succinctly observed that "too much is expected of the helicopter . . . chiefly because most people have not had the opportunity to become completely familiarized with helicopter design, production and operation." One of the principal reasons for FLIGHT MAGAZINE's annual helicopter edition is to help correct the situation Mr. Bell complains about. Accelerated progress in rotary-wing development can come about only through complete public, government and industry understanding of all the complex factors involved.

A great many government officials as well as people within the industry appear to be disillusioned about the helicopter. But is it not their own fault that they listened to the promoters and false prophets of the last decade, and built up phoney ideas as to helicopter expectations and potentialities? This spirit of disillusionment must not be permitted to hinder full development of the helicopter. Rather, the fact that the helicopter has not blossomed out into widespread realms of utilization outside military channels should serve as a stimulus for all of us, particularly government policy makers and the industry itself, to put less dependence on military orders and more emphasis on broadened commercial utilization. The government can do it through Civil Aeronautics Board policy and the industry can do it through realistic market research and intelligent sales promotion.

What most people fail to realize is that rotary-wing development is still very much in the invention stage. This fact was impressively driven home to us last month when we strapped on a seat and shoulder harness, hooked onto a dangling wire cable and were hoisted comfortably into a Bell air-sea rescue helicopter hovering fifty feet above our head. After a short ride the helicopter returned to its original position and softly lowered us to the ground.

Just think of the tremendous significance of convertiplanes, when they come, with the hovering and vertical take-off ability of the helicopter and the horizontal speed characteristics of conventional fixed-wing aircraft. The helicopter industry is knocking on the door of success to this fascinating invention despite the seemingly insurmountable technical engineering problems involved.

If one is to have an intelligent perspective of the helicopter, its development and the implications of its great value to national defense, air commerce and to human life, one must realize that the engineers will win all the battles eventually but it requires time, money and patience. It is up to Uncle Sam to re-appraise the value of the peculiar advantages of rotary-wing machines on the basis of our national interests on a long-term basis. If this is done by competent military and civil authorities, we are convinced that our present helicopter air mail services will be expanded rather than curtailed and that more funds will be provided in the field of research and development, to permit not only an expansion and acceleration of technical investigations now being carried on by the major rotary-wing companies but also an expansion of scientific investigation through research and development contracts to the small, struggling and presently ignored outfits and inventive geniuses at work in lofts and basements and backyards.

Now is the time for such an appraisal. We are at the crossroads and the tide could turn either way.

"C. R." ON LOCAL AIR SERVICE

YOU can always count on the president of American Airlines to make sense any time he decides to make a public utterance. C. R. Smith recently gave the National Defense Transportation Association an accurate and realistic run-down on our nation's scheduled air transportation system, its role in national defense, its progress and something of our present weaknesses.

While "C. R." commended the Air Coordinating Committee for its recent work in drafting its 1954 air policy report, he took exception to some of the specific recommendations as regards overseas air carriers and the local service airlines. In the latter case he stands adamant against the trunk lines taking over the local service routes. "It is no news," he said, "that local air service cannot continue without some government aid. That was well known and recognized at the time the local service carriers were certificated. How long it would take to get them on a self-sustaining basis was a matter of conjecture then, and it remains so today . . . there are many hopeful signs that the local service carriers are going in the right direction. They should be encouraged to continue and their opportunity should not be foreclosed."

While we can not agree with Mr. Smith that the ACC report is a basically constructive job, we heartily underscore every word he has to say about the recommendations on local air service. His long years of successful airline management, crowned some years ago by departing from government subsidy for his own company, qualifies him to speak with unimpeachable authority of what's good and what isn't good for this nation in so far as air transport is concerned. Let's hope his words will be heeded by those who haven't had any experience yet but are called upon to make Federal policy.

FOREIGN DELIVERY FLIGHTS

MAX Conrad's non-stop delivery of a Piper Apache from New York to Paris, France, last month stirred up quite a bit of national newspaper, radio and TV coverage. It was a sensational flight showing that modern lightplanes and their engines and accessories offer genuine

SOMETHING NEW IN AIRPLANE MERCHANDISING is a full-scale cutaway Aero Commander cabin and nose section. A traveling exhibit, it has been shown by the factory at its distributors' hangars and at the National Aircraft Show.
—(Aero Design Photo.)

dependability — 3,625 miles were flown in 22 hrs., 23 mins. to average 161 mph.

The news coverage had Conrad battling snow and ice storms, with no radio communications and with gas fumes from heavily-loaded extra gas tanks in the cabin ruining his food. Yet it was Max's avowed intention of "encouraging youth to fly" as well as making a spectacular delivery flight of a modern executive type American plane.

The Apache is too fine an airplane to be misrepresented as it was in such a stunt, where Max Conrad plainly misused it and had his neck out — unnecessarily. The Apache was developed as an everyday business plane with plenty of performance, safety and comfort for operation as a business plane. It can be flown across the Atlantic safely and sanely just as scores of other twin-engine business planes have been and are being flown across — along well-established airways through Greenland and Iceland and in a routine manner by competent crews with good radio communications at all times, with plenty of margin for safety, and in comfort.

We know some crews who specialize in foreign aircraft delivery and we feel confident in recommending them for such deliveries because we have made similar trips with them. These are the crews operated for aircraft manufacturers and private plane owners by Fleetway, Inc. Anybody can hire the crews. The address is 3022 North Hollywood Way, Lockheed Air Terminal, Burbank, California.

The rates are reasonable, the insurance is incredibly low and the service is top-notch. Jack Ford, president of the firm, and his associates have invested six years of hard work and all the war-savings they had to make international aircraft ferrying a routine, safe-and-sane, business-like venture. They have delivered some 4,000 planes, 1,000 of them across the Atlantic. They haven't gotten rich but their record is outstanding and they have won the admiration and respect of aircraft manufacturers and brokers, military services without which it is practically impossible to operate internationally these days, foreign governments, international airports and airways traffic control centers. There are other good ferrying outfits worthy of our confidence, too, but we know of Fleetway through our personal experiences. One is operated by Bill Sparks, who has ferried hundreds of Piper airplanes in this country and to South America. ★ ★ ★

AIR SHOW DRAWING POWER was demonstrated recently when 170,000 persons flocked to Denver's Rocky Mountain Naval Air Exposition. Chance Vought Aircraft exhibited its F7U-3 Cutlass as shown in these scenes. Pilots are Bureau of Aeronautics representatives, being from left to right: Lt. Billy Phillips, Commander Red Brooks and Lt. Jack Christiansen of Dallas.
—(Chance Vought Photos.)

Atlantic Aviation opens new division at Philadelphia International Airport!

At Philadelphia, as at every other division, Atlantic Aviation specializes in meeting the needs of executive flyers and aircraft with prompt, courteous service.

Mr. Albert Mosley, Manager of Atlantic Aviation, Phila., Pa.

keeps 'em flying with Esso Aviation Products!

Atlantic Aviation, "the east coast's complete aeronautical service" uses Esso Aviation Products exclusively at its newest division located at the Philadelphia International Airport. With complete shop, storage, and servicing facilities, Atlantic specializes in meeting the needs of executive aircraft and flyers with efficient service . . . dependable, high quality Esso Aviation fuels and lubricants.

For quality and service you can always depend on Esso Aviation Products. There are hundreds of Esso Dealer Airports ready to supply your private or company plane with a complete line of high quality fuels and lubricants. Esso Aviation Products have been proved for over 44 years of actual flying.

For extra convenience take along an Esso Credit Card. You and your company can charge, in addition to gasoline, lubrication, tire and battery services, over-night storage in transit, and minor emergency repairs. Look for the famous Esso Wings for quality, service and convenience.

ESSO
AVIATION PRODUCTS

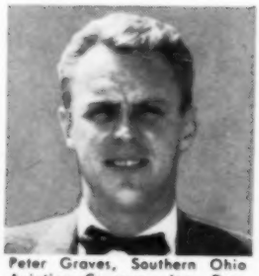
NATION-WIDE **SALES & SERVICE** ORGANIZATION

AERO DESIGN Commander 560

Don Pennington, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

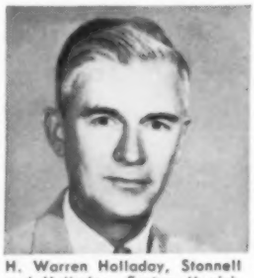
Gene Hudman, Carolina Division of Southern Aero, Inc., Charlotte, North Carolina.



Peter Graves, Southern Ohio Aviation Company, Inc., Dayton Municipal Airport, Vandalia, Ohio.

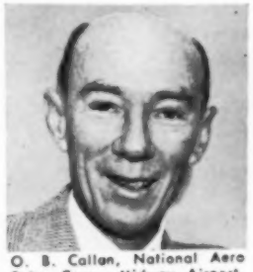
Charles H. E. Westerman, British Colonial Airlines, Calle Lopez No. 1 — Despacho 502 Mexico, (1) D.F., Mexico.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.



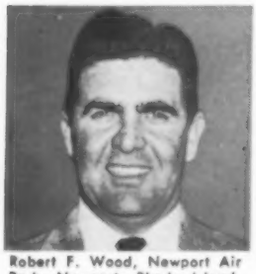
H. Warren Holladay, Stonnell and Holladay, Easton Municipal Airport, Easton, Md.

Don Hood, Air Sales & Service, Inc., Weir Cook Municipal Airport, Indianapolis, Indiana.



O. B. Callen, National Aero Sales Corp., Midway Airport, Chicago, Ill.

B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.



Robert F. Wood, Newport Air Park, Newport, Rhode Island.

Louis Humphreville, Executive Aircraft Corp., Detroit City Airport, Detroit 13, Michigan.

Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.

A M "Sime" Bertolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania

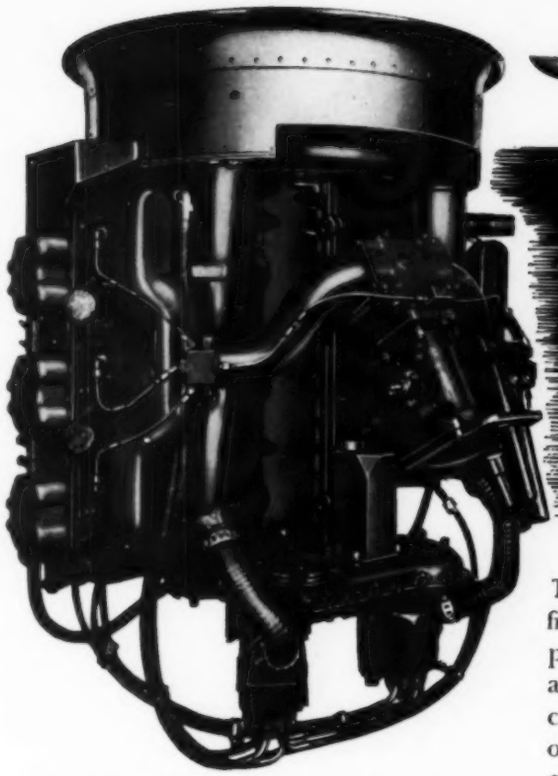
Max R. Brand, Aero Commander Distributors, Hangar 3, P.O. Box 8426, Municipal Airport, Tulsa, Oklahoma.

AERO DESIGN Commander

NATION-WIDE SALES and SERVICE

AERO DESIGN AND ENGINEERING COMPANY

TULAKES AIRPORT • OKLAHOMA CITY, OKLAHOMA



Franklin

A new compound-type piston engine

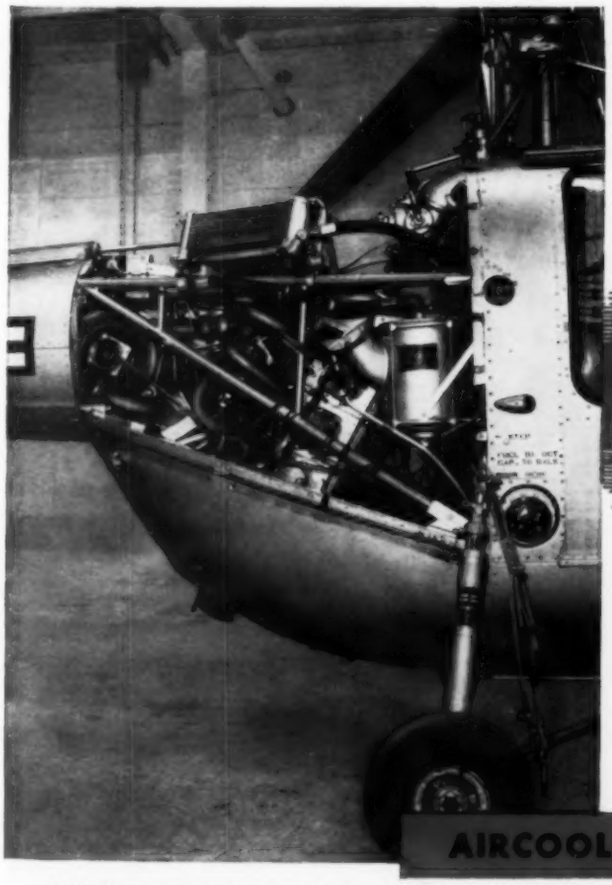
of unmatched efficiency in the small engine field

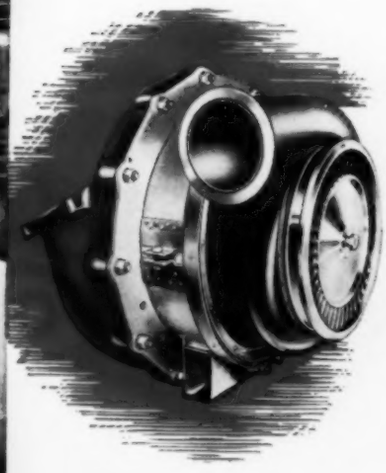
Franklin 0-425-13 turbosupercharged engine, with engine driven fan, integral cooling air system and dry sump lubrication system, for approximate vertical installation in helicopters. Adaptable for horizontal installation by minor changes in oil system.

This new Franklin 0-425-13 turbosupercharged engine, as qualified for the U.S. Army Transportation Corps, produces a take-off power rating of 300 BHP from sea level to 10,000 ft. altitude and a normal rating of 285 BHP from sea level to 12,300 ft. In calibration tests, performance in excess of 400 BHP has been obtained at sea level standard conditions.

Specific weight of the engine-turbo combination for helicopter or submerged installation is only 1.55 lb/hp, and for fixed wing aircraft only 1.43 lb/hp. Fuel consumption is notably low — .55 lb/BHP/Hr S.L.T.O.

The combination of superior altitude performance, low specific weight and fuel economy offered by this power package results in increased payload and greater range whether installed in a helicopter or in a conventional fixed-wing aircraft. We will be happy to discuss specific applications with interested airframe manufacturers.



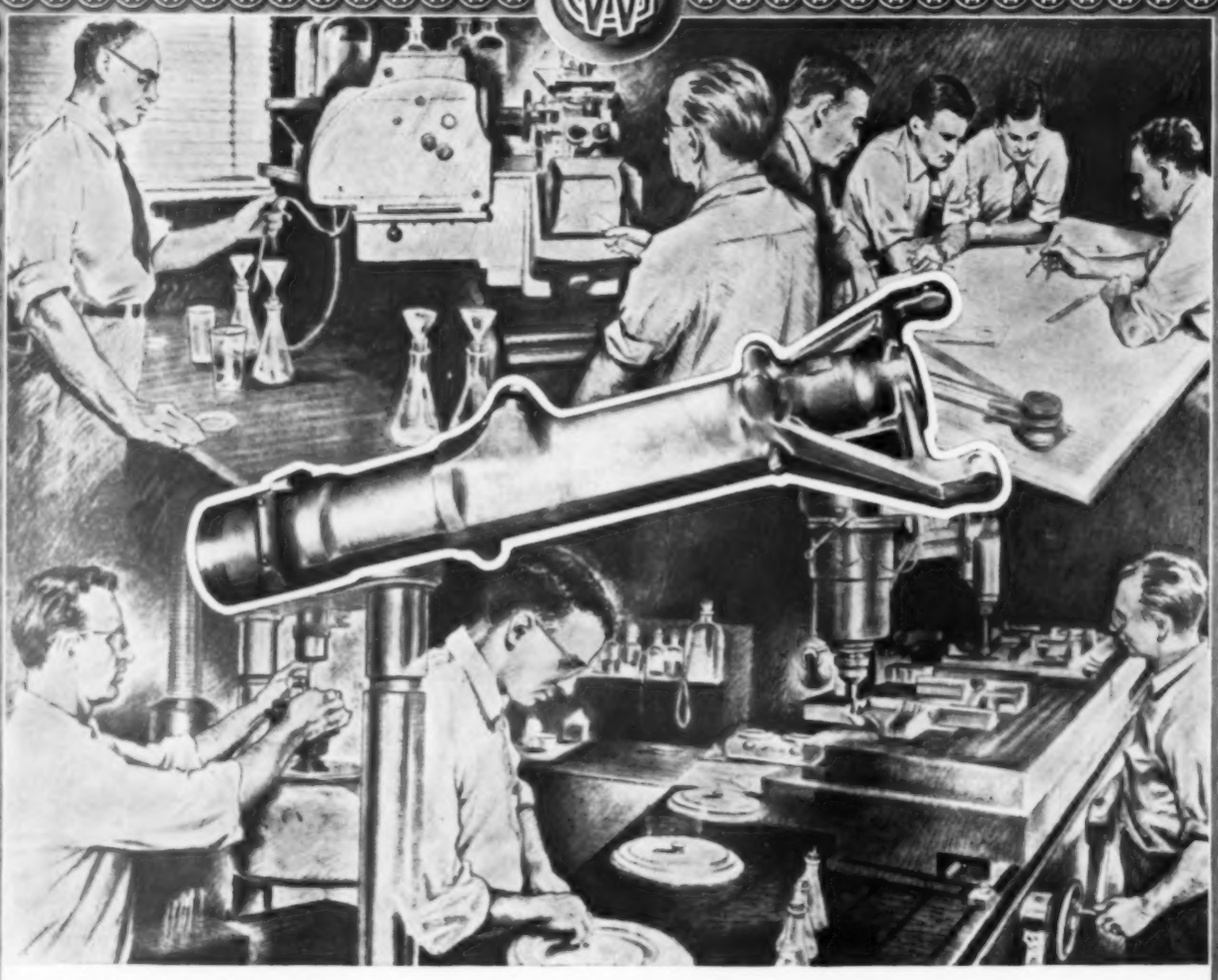


Turbosupercharger designed and developed by Aircooled Motors for the Franklin 0-425-13 engine. Will supply 40" of mercury absolute pressure at carburetor inlet up to 16,000 ft. altitude. Adaptable for engines up to 400 HP and with modifications to engines of 200 HP. Weight only 36 lbs.

Franklin 0-425-13 complete power plant (engine, turbo and regulator) installed in Army H-18 helicopter shows compactness and adaptability to existing airframes.

AIRCOOLED MOTORS, INC., SYRACUSE, N. Y.

Smith, Kirkpatrick & Co., Inc., 46 Trinity Place, New York 6, N. Y. • Export Distributors of "Aircooled" Products • Cable Address "Kirksmith"



FORGING TECHNICIANS—Yes, that is the compliment paid us by those acquainted with our services. In back of each design is a thorough understanding of engineering and metallurgical needs before production begins . . . assuring forgings of maximum physical properties and uniform quality.

THE LANDING GEAR FORGING illustrated, nearly five feet long, is an important component for a modern military fighter . . . another example of Wyman-Gordon's technical contribution to aircraft.

There is no substitute for Wyman-Gordon experience

WYMAN-GORDON

Established 1883

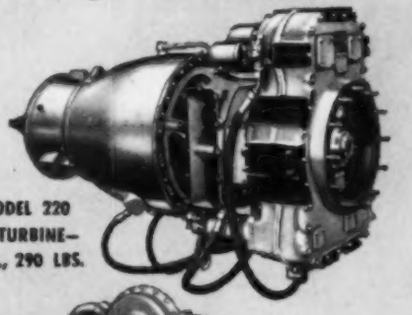
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER, MASSACHUSETTS

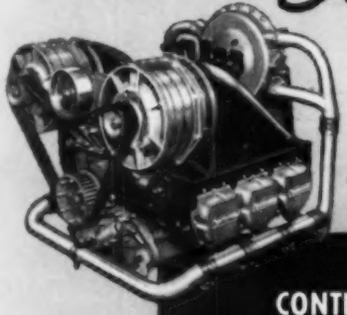
HARVEY, ILLINOIS DETROIT, MICHIGAN

CONTINENTAL... Out in Front in Helicopter Power

Outstanding Engines of Both Types... Piston and Turbine... Embody Results of Experience Dating from 1902



CAE MODEL 220 SHAFT TURBINE— 425 H.P., 290 LBS.



CMC MODEL FS0470 SUPERCHARGED AND FAN-COOLED HELICOPTER ENGINE—260 H.P.

New, modern helicopters are finding it increasingly beneficial to make use of the latest Continental developments for power production. Two examples of recently tested engines built around Continental power plants are shown. One—the Sikorsky XH-39 at left, above — employs the CAE Model 220 shaft turbine; the other — Cessna's CH-1 at right — uses CMC Model FS0470 piston engine. Both are unique.

The XH-39—first helicopter with completely retractable landing gear — holds the world's record for helicopter altitude (24,500 ft.) and in addition, the world's record for helicopter speed (156.005 m.p.h.). The CH-1 features simplified design, using one-third fewer gears. Location of engine in the nose makes for ease of access, promotes efficient cooling, and frees the center of gravity behind the cockpit for use in disposable load.

Thus Continental supplies each type of power plant to suit the peculiar requirements of two widely different modern helicopter design concepts. Additional power plants engineered for their suitability for helicopters will be forthcoming from the Continental organization within the near future, and great things can be expected.

FOR TURBINE INFORMATION, ADDRESS
CONTINENTAL AVIATION & ENGINEERING CORPORATION
12700 KERCHEVAL AVENUE, DETROIT 15, MICHIGAN

LOOK AHEAD—JOIN AIR FORCE

FOR RECIPROCATING ENGINE INFORMATION, ADDRESS
CONTINENTAL MOTORS CORPORATION—Aircraft Engine Division
205 MARKET STREET, MUSKEGON, MICHIGAN

New Turbine-Powered Cargo Carrier

hauls big pay loads faster

Allison T56 Turbo-Prop Engines Power New Lockheed YC-130 Transport

The initial flight of the YC-130 Medium Cargo Transport marks another great forward stride in transport aviation.

This giant carrier, built by Lockheed for the U. S. Air Force, is the first U.S.A.F. cargo plane designed from the very beginning for Turbo-Prop engines.

Powered by four of the new Allison T56 Turbo-Prop engines, this great new cargo airplane can haul heavy pay loads long distances at speeds required by our new modern combat jet Air Force. It is ideally suited to carry many types of heavy military equipment, on either long-range operations or in close support of troops. It also can be fitted as a combat troop carrier or an ambulance plane. The YC-130 can operate from shorter runways with greater rate of climb than either reciprocating or Turbo-Jet engine aircraft.

All this, plus its economical use of lower cost fuel, label the Turbo-Prop engine as the "work horse" power for future transports. And Allison, with its unmatched experience in high-powered Turbo-Prop design and manufacture, today offers both T56 and T40 engines to serve a broad range of modern flight requirements.

GM GENERAL MOTORS — Allison Division of General Motors, Indianapolis, Indiana

In helicopters . . .

TCP *boosts spark plug performance*

To GUARD against serious loss of engine power caused by spark plug misfiring . . . particularly in the heavy-duty operation of normal short hops . . . leading helicopter operators are using Shell's TCP* additive.

TCP additive controls spark plug fouling caused by lead and carbon deposits. By using TCP, operators get longer spark plug life, more power . . . greater dependability.

It could pay *you* to look into the advantages of Shell's TCP . . . see how this additive saves costly maintenance and insures greater overall engine reliability.

*Trademark owned and patent applied for by Shell Oil Company.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

LEAR

ARCON®

"Marks the beginning of a new era of both utility and safety"

...says Leighton Collins

WHAT IS THE LEAR ARCON? Left to itself, the average plane wants to fly in a circle. With the Lear Arcon, your plane wants to fly *straight*—until *you* want it to turn, thus eliminating the deadly "graveyard spiral"—always a threat to the non-instrument pilot.

IS THE ARCON AN AUTOPILOT? No, but it is the *next best thing* to an autopilot, especially when you are under pressure to do something else, such as navigate, communicate, or just plain relax.

IS IT A SUBSTITUTE FOR AN INSTRUMENT RATING? No more than a life-preserver is a substitute for knowing how to swim. However, the Arcon could save your life if you were inadvertently caught in "weather," and it will ease the burden of the qualified instrument pilot who *deliberately chooses* to fly instruments.

WHY IS IT THE FINEST DEVICE OF ITS KIND? The Arcon is simple, fool-proof, uncompromising in quality. Magnetic amplifiers are used instead of tubes—"printed" circuits instead of wires. No trim lights to monitor. Built to military standards of performance and dependability. Designed for trouble-free operation.

WHAT TYPE OF PLANE IS IT SUITABLE FOR? All types. And equally easy to install in all.

IS IT CAA APPROVED? Every Arcon installation is CAA approved for each airplane type.

IS IT INDUSTRY APPROVED? The Arcon will soon be offered as *factory* installed equipment by most leading aircraft manufacturers.

IS IT PILOT APPROVED? Ask any pilot who has had an opportunity to fly it. You will soon find very few pilots who will fly without it, because it makes an airplane fly the way it should fly—automatically. The Arcon is here *now*. See it. Fly it. Discover how it "marks a new era of safety and utility" for *you!*

See your nearest Lear distributor or write for full information to Lear Inc., LearCal Division 3171 S. Bundy Drive, Santa Monica, California.

***ARCON** means Automatic Rudder CONtrol*

LC-16

TWIN-ENGINE SIKORSKY S-56, shown as the Marine Corps' HR2S, compares in size with the DC-3. Power from two Pratt & Whitney R-2800 engines is shafted to the single main rotor and tail rotor. It cruises well over 150 mph. and is equipped for all-weather operations.
—(Sikorsky Photo.)

PIASECKI H-21C deliveries to the Army began in 1954. This 22-place transport is powered by a 1,450-hp. Wright engine. It has lifted a 105-mm. Howitzer weighing 4,150 lbs. A 14-place version, the H-21, has been delivered to the Royal Canadian Air Force. Piasecki completed 339 deliveries of HUP-type, 5-place Navy and Army helicopters in 1954 and is now developing a more powerful version. It employs 4,000 persons and has a $100,000,000 backlog of military orders.
—(Piasecki Photo.)

FIRST FLIGHT AT ALTITUDE was made last month over Philadelphia by the 42-place Piasecki YH-16 Air Force Transporter. It exceeded 130 mph. at 3,000-4,000 ft. A second ship, the YH-16A, has been equipped with two Allison shaft turbines for upcoming flight tests.
—(Piasecki Photo.)

TANDEM-ROTOR, SINGLE-ENGINE anti-submarine HSL-1 is in production for the Navy at Bell Aircraft. It has a Pratt & Whitney R-2800 engine. Bell is also producing the 200-hp. Model 47G. Bell has 3,800 employes.
—(Bell Photo.)

Helicopter Progress

COMMERCIAL helicopter utilization is making strides with helicopters developed primarily for military production and use and can now be expected to show more rapid growth as newest commercial designs become available. These are now undergoing Civil Aeronautics Administration certification and will be in production in 1955.

A FLIGHT MAGAZINE survey shows that some 250 commercial helicopters, having a combined current value of $5,000,000 or more, grossed about $5,000,000 in 1954 commercial operations throughout the United States and Canada. Ninety per cent of them are small Bell and Hiller 3-place, 200-hp. machines with limited payload capacity. A score of larger 600-hp. and much more costly Sikorsky S-55 helicopters are in commercial activity, mostly in experimental air carrier passenger operations, although a few are being acquired by the larger commercial operators at a price which averages about $150,000 each in contrast to $33,500 to $35,000 each for the smaller helicopters.

Commercial helicopters average 300 to 400 hours or more of operation per year and it is common to find the larger operators obtaining utilization of 700 hours and more from their machines. Hourly rates vary but $75 is a widely-quoted rate for the 200-hp. helicopters, while rates for the Sikorsky S-55's are usually negotiated for each contract, ranging upward from $150 per hour. Literally hundreds of uses are found for the rotorcraft — all of them having to do with performing a job more effectively by helicopter than by any other means. They include cargo and personnel flying on construction projects, agricultural flying, right-of-way patrol, aerial mapping and survey, advertising, and commercial fishing. A hot spot for commercial helicopters at the moment is along the Louisiana and Texas Gulf coast, where petroleum firms are putting them to work in offshore drilling and development.

Several helicopter operators are doing close to $1,000,000 a year in business. One is Petroleum Helicopters at Lafayette and New Orleans, Louisiana. Organized with 3 used Bell Model 47's in 1949 by Bob Suggs of San Antonio, M. M. Bayon of New Orleans and F. W. Lee of Denver, this firm now has 17 helicopters, representing a $600,000 investment, 50 employes including 18 pilots and 20 mechanics, and has completed its busiest summer. Two of its Sikorsky S-55's hauled 5,855 passengers and 900,000 lbs. of cargo during October, 1954 — all in contract offshore drilling activity. Its utilization averages 55 hrs. monthly for Bells and 100 hrs. monthly for S-55's. The company recently began a branch operation in South America.

Largest of the commercial helicopter operators is Rick Helicopters of Los Angeles, with 22 helicopters, most of

them Bells. Its president and founder, James Ricklefs, is like most operators and is reluctant to talk in dollars and cents about his financial success. But he is making money, and points out that five of his employes are driving Cadillacs. A third big-time operator is Carl Agar's Okanagan Helicopters, Ltd., of Vancouver, British Columbia. He has consistently paid 5% dividends to holders of Class A and B stock in his company and operates two Sikorsky S-55's and 13 Bell Model 47's which his firm owns and two Bells and a Sikorsky which he leases. Okanagan's big business has been contract flying for a $600,000,000 construction project involving the Aluminum Company of Canada's building of a smelting plant and hydro-electric generating plant in the mountainous wilderness of British Columbia, where the helicopter is indispensable. In 37 months, Agar's copters hauled 14,000 passengers and 1,750,000 lbs. of cargo on this job.

Art Fornoff, who sparkplugged organization of the Helicopter Association of America, composed of commercial operators, furnishes some interesting figures on West Coast helicopter operations. Of 15 operators contacted, 6 using 18 helicopters preferred not

Helicopter Designation Chart

Commercial Designation	No. of Places	Engine (Make)	Hp.	Military Designation
American	1	Pulse-Jet	—	XH-26 (USAF, USA)
Bell 47	2	Franklin	178	YH13 (USAF, USA); HTL-1 (USCG, USMC, USN)
Bell 47B	2	Franklin	178	
Bell 47B3	2	Franklin	178	
Bell 47D	2	Franklin	178	H13B (USAF, USA); HTL-2 (USCG, USMC, USN)
Bell 47D1	3	Franklin	178	H13C (USAF, USA)
Bell 47D1	3	Franklin	200	H13D (USAF, USA); HTL-4 (USCG, USMC, USN)
Bell 47D1	3	Franklin	200	H13E (USAF, USA); HTL-5 (USCG, USMC, USN)
Bell 47E	2-3	Franklin	200	HTL-3 (USCG, USMC, USN)
Bell 47G	3	Franklin	200	H13G (USAF, USA)
Bell 47H	3	Franklin 200		
Bell 47J	4	Lycoming 220		
Bell 48	10	P&W	600	YH12 (USAF, USA)
Bell 54	2	Continental	275	XH15 (USAF, USA)
Bell 61	(16)	P&W	1,900	XU-3 (USAF, USA); XHSL-1, HSL-1 (USN)
Bell 200	—	P&W	—	XV-3 (USAF, USN) (Convertiplane)
Bell 201	3	Artouste Turbine	280	XH-13F (USAF, USA)
Cessna CH-1	2-4	Continental	260	
Hiller 360 (UH-12)	3	Franklin	178	
Hiller 360 (UH-12A)	3	Franklin	178	H-23A (USAF, USA); HTE-1 (USN)
Hiller 12-B (UH-12B)	3	Franklin	200	H-23B (USAF, USA); HTE-2 (USN)
Hiller HJ-1 Hornet	2	Hiller 8RJ2B Ram Jet	92	H-32 (USAF, USA); HOE-1 (USN)
Hughes Classified	—	GE TG-180	—	XH-17 (USAF)
Kaman K-240	3	Lycoming	245	HTK-1 (USN)
Kaman K-3	4	P&W	600	HOK-1 (USN)
Kaman K-5	2	Boeing Turbine	190	K-225 (USN)
Kaman	3	2 Boeing Turbines	190 (each)	HTK-1 (USN)
McDonnell XV-1	4	Continental & 3 Pressure Jets	—	XV-1 (USAF, USA)
McDonnell XHCH-1	—	Pressure Jets	—	XHCH-1 (USN)
Piasecki	10	P&W	600	HRP-1 (USN)
Piasecki	10	P&W	600	HRP-2 (USMC, USN)
Piasecki	6	Continental	525	HUP-1 (USN)
Piasecki	6	Continental	550	HUP-2 (USN)
Piasecki	6	Continental	550	H-25 (USA)
Piasecki	16	Wright	1,150	YH-21 (USAF)
Piasecki	16	Wright	1,150	H-21A (USAF)
Piasecki	22	Wright	1,425	H-21B (USAF); H-21C (USA)
Piasecki	44	2 P&W	1,650 (each)	YH-16 (USAF)
Piasecki	44	2 Allison T-38	—	YH-16A (USAF)
Piasecki		Turbines		
Sikorsky	2	Warner	280	R-4-A (USAF)
Sikorsky	2	Warner	280	R-4-B (USAF); HNS-1 (USCG, USN)
Sikorsky	2	P&W	450	R-5-A (USAF); HO2S-1 (USCG)
Sikorsky	2	P&W	450	R-5-C (USAF)
Sikorsky	3	P&W	450	R-5-D (USAF)
Sikorsky	2	Franklin	225	R-6-A (USAF); HOS-1 (USCG, USN)
Sikorsky	4	Franklin	225	HOS-2 (USCG)
Sikorsky S-51	4	P&W	450	H-5-F (USAF); HO3S-1 (USCG, USMC, USN)
Sikorsky S-51	4	P&W	450	H-5-G (USAF); HO3S-1 (USCG, USMC, USN)
Sikorsky S-51	4	P&W	450	H-5-H (USAF)
Sikorsky S-52-2	3-4	Franklin	245	YH-18 (USAF, USA); HO5S-1 (USN)
Sikorsky S-52-3	3-4	Franklin	245	HO5S-1 (USCG, USN)
Sikorsky S-53	4	Continental	550	XHJS (USN)
Sikorsky S-55	10-12	P&W	600	YH-19 (USAF); HRS-1 (USMC); HO4S-1 (USN)
Sikorsky S-55	10-12	P&W	600	H-19A (USAF); H-19C (USA); HO4S-2 (USCG); HRS-2 (USMC)
Sikorsky S-55	10-12	Wright	700	H-19B (USAF); H-19D (USA); HO4S-3 (USCG); HRS-3 (USMC)
Sikorsky S-56	—	2 P&W	1,900 (each)	H-37 (USAF, USA); HR2S (USMC, USN)
Sikorsky S-57		Classified		
Sikorsky S-58		1 Wright	1,425	H-34 (USAF, USN); HUS (USMC); HSS (USN)
Sikorsky S-59	4	Artouste II	400	YH-39 (USAF, USA)

(Only member companies of the Helicopter Council, AIA, are represented in this compilation)
*Confirmation of the membership of the American Helicopter Division, Fairchild Engine & Airplane Corporation, is a formal action of the AIA Board of Governors, to be taken at its annual meeting in December.

NEW EXECUTIVE BELLS are the Model 47H 3-place (above) and Model 47J 4-place (far right). Both are undergoing CAA licensing for production in 1955. Streamlining has pushed the 47H's cruising speed to 100 mph. with improved 200-hp. Franklin engine. Note its executive interior (top, right). Basic Model 47 design now has over a million hours of operation behind it.
—(Bell Photos.)

FIRST 4-PLACE BELL, the Model 47J (above), uses a 260-hp. Lycoming derated to 220 hp. for reduced maintenance. Bell has numerous kits for its conversion in minutes to several different uses — executive travel (note interior at left, bottom), ambulance, cargo, rescue work with powered hoist, and other jobs.
—(Bell Photo.)

WIDELY-USED HILLER UH-12B is sold and serviced by 45 distributors in the U. S. and abroad. It is 200-hp., 3-place model. Hiller has a new Navy order for development of a 1-man XROE-1 rotorcycle powered by a Nelson 4-cylinder, 2-cycle engine. An additional military order was placed recently for more 2-place ramjet-powered Hiller Hornets for evaluation.
—(Hiller Photo.)

to divulge details of their business but 6 operators using 52 helicopters reported they grossed $2,065,160 during the last 12 months while flying 21,376 hours. These six operators employ 55 pilots and 51 mechanics. Two government agencies operating one helicopter each flew a total of 1,492 hrs. during the last 12 months.

Six helicopter manufacturers have obtained CAA type certification for a wide range of helicopters, but practically all commercial operations are being conducted with Bell, Hiller and Sikorsky models which compare as follows:

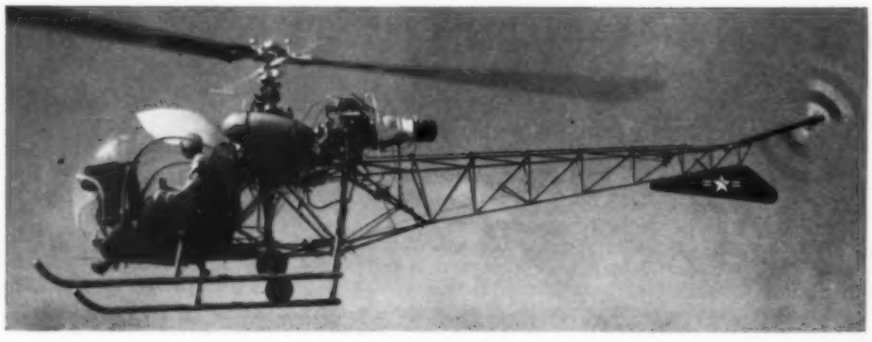
	Bell 47G	Hiller UH-12B	Sikorsky S-55
No. Places	3	3	10
Horsepower	200	200	600
Gr. Wt., lbs.	2,350	2,500	6,900
Empty Wt., lbs.	1,409	1,656	4,550
Useful Ld., lbs.	941	844	2,350
Fuel Cap., gals.	40	28	190
Cr. Spd., mph.	78	70	86

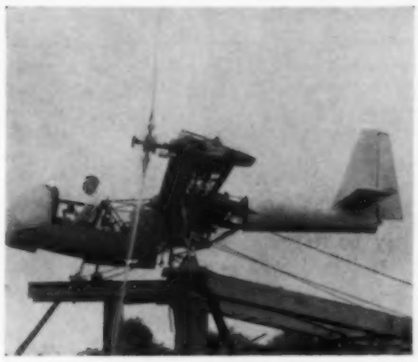
Multi-engine commercial helicopters have not yet been marketed by the manufacturers. Until they are, single-engine limitations will handicap the

First Shaft Turbines

Continental Motors' new Artouste shaft turbines power the first Sikorsky (XH-39, right) and Bell (XH-13, below) jet helicopters. No details have been released on the Bell, which uses a 280-hp. Artouste I. The 4-place Sikorsky, with a 400-hp. Artouste II, holds 156.005-mph. speed and 24,500-ft. altitude records. Grossing 3,560 lbs. the XH-39 has a 1,360-lb. useful load and 55-gph. fuel consumption.

TWO VERSIONS OF "FLYRIDE" 2-place helicopter design are being licensed for marketing by Glenview Metal Products of Delanco, N. J. Model R will have semi-conventional control system, Model S simplified single-stick control. Both have 140-hp. Lycoming engine, over 500-lb. useful load, 100-mph. cruise, 220-mi. range on 22 gals. of fuel. Production of 50 Flyrides in 1955 is planned, at price to be announced.





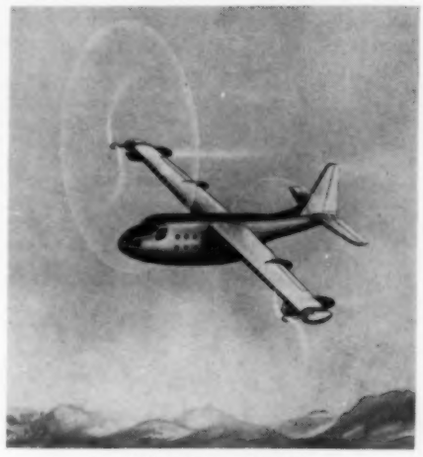
Transcendental 1-G

McDonnell XV-1

Jacobs Model 104

Convertiplanes

Four active convertiplane experiments are in progress, all using stub wings for lift while cruising. McDonnell Aircraft's USAF XV-1 has a 550-hp. Continental engine which supplies air to tip-mounted pressure jets for vertical flight and shaft power to a pusher propeller in forward flight. Bell Aircraft's Air Force XV-3, due to be rolled out soon, has tilting wing-tip rotors driven by a piston engine. Jacobs Aircraft Engine Company's 5-place, 350-hp. Model 104 is a private venture, combining for the first time an engine and transmission as a single unit. It drives a pusher propeller as well as the main and tail rotors. Another private venture is that of Transcendental Aircraft Corporation's Model 1-G, powered by a 160-hp. Lycoming shafted to wing-tip tilting rotors.



Bell Cargo Study

GYRODYNE GCA-2C is 5-pl., 450-hp., 5,750-lb. helicopter having a 1,950-lb. useful load. It is one of several co-axial designs by the Gyrodyne Company of America, which has a new Navy contract to develop a 1-place XRON-1 co-axial rotorcycle powered by a 4-cylinder, 2-cycle Nelson engine. Firm also has a 2-place, 150-hp. design and a design for a huge 100,000-lb. co-axial transport powered by four 3,400-hp. Wright turbo-compound engines.

development of helicopter transportation, especially scheduled air carrier helicopter operations. Until now, most certificated helicopter airline activity has been devoted to mail and cargo by three metropolitan carriers — Los Angeles Airways, Helicopter Air Service at Chicago and New York Airways. New York inaugurated limited helicopter passenger service in July, 1953, and Los Angeles Airways began carrying passengers between L. A. International Airport and Long Beach in November, 1954. Both use Sikorsky S-55's. HAS at Chicago uses small Bell Model 47's.

Selected statistics for these three certificated carriers for the last three years include the following from Civil Aeronautics Board reports:

	1952	1953	1954
Rev. Plane Miles	631,475	1,010,602	1,083,612
Air Mail Ton-miles	74,974	124,364	122,356
Total Rev. Ton-miles	74,977	128,914	146,798
Av. Payload, lbs.	237	255	271
Av. Payload Cap., lbs.	572	694	712
Route Mi. Operated	512	697	674

Total operating expenses for the three carriers during the year ending Sept. 30, 1954, were $2,671,454, which emphasizes that they represent a modest Federal program and public service. Of this amount, total direct operating expense was $1,610,492 and total in-

(Continued on page 62)

Bensen B-6 Gyro-Glider

Miniature Copters

A new crop of single-seat rotorcraft has made its appearance. The new Goodyear GA-400R (right) is powered by a 25-hp. 2-cycle engine built by an outboard motor concern. It grosses just over 400 lbs. Igor Bensen of Raleigh, N. C., is selling a B-6 Gyro-Glider (left) in kit form by mail order. It is towed behind an auto, taking off at 23 mph. Prices range from $10 for blueprints to complete kits at $285, $395 and $450. Empty weight is 103 lbs., rotor diameter 20 ft., landing speed 7 mph., glide ratio 4 to 1.

Goodyear GA-400R

This scene is common in the European cities served by Sabena Belgian Airlines helicopter schedules. It shows the airline agent leading four passengers to board a 7-passenger Sikorsky helicopter in mid-town Brussels.
—(Sabena Photo.)

Copter Airline Outlook

By A. V. J. VERNIEUWE
Vice President, Operations,
Sabena Belgian Airlines

WESTERN Europe seems to be the ideal area for the expansion of passenger helicopter transportation. The density of its population covering a large number of cities and its rather slow means of surface transportation are, in fact, sure guarantees of a progressive and constant expansion of this means of air transportation serving the city centers. For example, within a radius of 215 miles of Brussels there are 72 million inhabitants consisting of British, Germans, French, Dutch, Belgians and Luxemburgers.

Looking carefully into these various data, in August, 1950, Sabena bought 3 Bell 47D-1 copters and inaugurated a regular mail network of 225 miles which has been operated every day for more than 4 years with a great regularity.

Having gathered valuable operational and technical experience, three years later Sabena bought 4 Sikorsky S-55 copters and on September 1, 1953, the first scheduled international helicopter network for passenger transportation was officially opened.

30,000 Helicopter Passengers

This network links Brussels to France, Holland and Germany. Since the beginning of helicopter operations, we have carried more than 30,000 passengers. This number compared to fixed-wing figures seems small. However, it took Sabena more than 10 years of fixed-wing operation to reach such figures. Born in 1921, the first 25,000-passenger mark was only reached by our airline in 1931.

Our brief experience in helicopter passenger transportation shows clearly that the helicopter attracts passengers not only because it reduces the journey by half but also because helicopters fly at relatively low speeds and altitudes, and enables them to enjoy the scenery.

Our feeling is that in Europe the helicopter will fill three tasks which may be summarized as follows:

1. The helicopter will replace fixed-wing aircraft on short inter-city routes where it will be faster.
2. The helicopter will feed passengers to fixed-wing aircraft, bringing them to the major airports from cities without airports, or even if they have an airport but are not linked to the international fixed-wing network.
3. The helicopter will later compete with the existing ground transportation means and gather for aviation the most important market of short-distance transportation by linking cities which today have to rely on surface transportation.

Requirements for Expansion

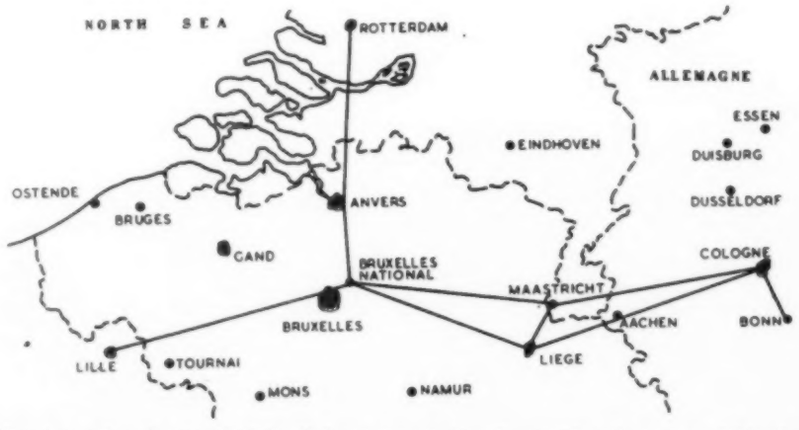
First of all, from an economical point of view, the helicopter operating costs should be decreased considerably. However, helicopter fares may be higher than fixed-wing ones as the helicopter will fly from city center to city center and will thus cancel the bus fare between town and airport.

To lower costs, the constructors should promote the growth of and build multi-engined helicopters carrying up to 40 passengers and even more, over distances up to 300 miles.

The cruising speed should not be less than 150 mph., and the one-engine-out climb speed not more than 30 knots.

If we exclude hovering, which appears unnecessary for scheduled helicopter operations, instrument flying seems practicable with the same basic instruments as for fixed-wings. Before

(Continued on page 54)



Helicopter network operated by Sabena serves heavily-populated corner of Northwest Europe. Distances, flight times and fares from Brussels include following: Rotterdam, 73 miles, 70 mins., $6.90; Lille, 60 miles, 50 mins., $5.90; Bonn, 131 miles, 1 hr. 50 mins., $10.40, and Maastricht, 55 miles, 53 mins., $5.40.

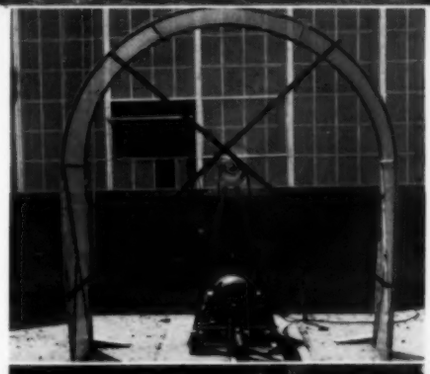
This wind tunnel model for aerodynamic studies was made in 1952. Hundreds of hours of test-stand operations (right) have been logged with power plants, transmissions and rotors. Club rotors are shown here for full-power tests.
—(Cessna Photos.)

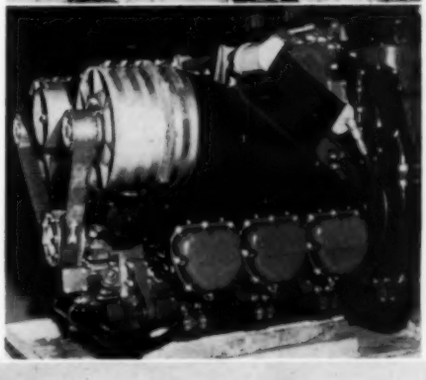
Cessna CH-1 Project

SOME of the steps in the development of Cessna Aircraft Company's new CH-1 helicopter are shown on this page. The new design, incorporating several helicopter innovations, is expected to complete CAA certification tests soon but it is doubtful that Cessna will market the CH-1 or a successor version during the next six months.

Meanwhile, only barest details have been divulged pending certification. These include a 3,000-lb. gross weight and 1,900-lb. empty weight; a supercharged FSO-470 Continental engine said to deliver 260 hp. to the transmission; simplified heavy-duty automotive-type transmission gears described as being similar to those used in earth-moving equipment, and simplified main rotor system. The prototype's 1,100-lb. useful load allows carrying 4 persons and 60 gals. of fuel, with cruising speed above 100 mph.

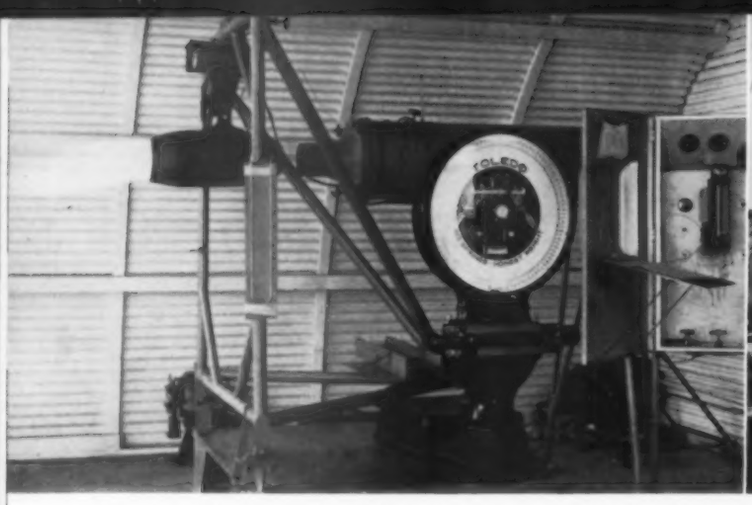
Jack Leonard is manager of Cessna's Helicopter Division and Charles Seibel, who once worked for Bell on its original design, is chief engineer. ★ ★ ★

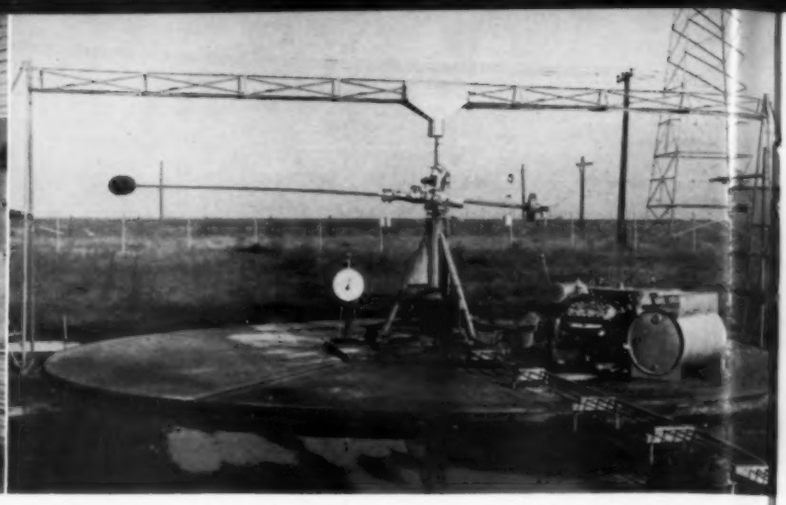




Small test stand for tail rotor is shown above. Continental FSO-470 engine at right has belt-driven supercharger at rear and belt-driven dual cooling fans at front.

Test Pilot Jack Zimmerman is shown below hovering first flying test bed in July, 1953. Finished prototype is pictured at right. Transmission is beneath floor board and rotor mast is between front seats. Glass between door and engine gives downward visibility.





Thrust calibration and whirl-stand operations with the Hiller ram jet engine are pictured. Development began in 1949, first flight was made in August, 1950, first 200-hr. duration run was in March, 1953, and a third duration run of 150 hrs. was completed in September, 1954. —(Hiller Photos.)

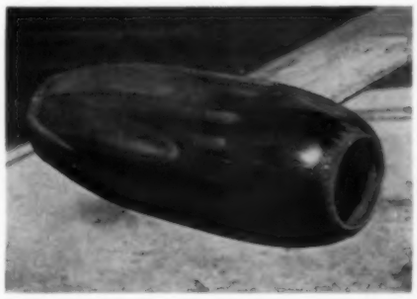
First CAA-Approved Ram Jet

CLIMAXING five years of development, over 550 flying hours and two thousand whirl-test hours of operation, the first ram jet engine ever approved by the Civil Aeronautics Administration was certified on October 22, 1954. It is the Hiller 8RJ2B designed and built by Hiller Helicopters, Palo Alto, California.

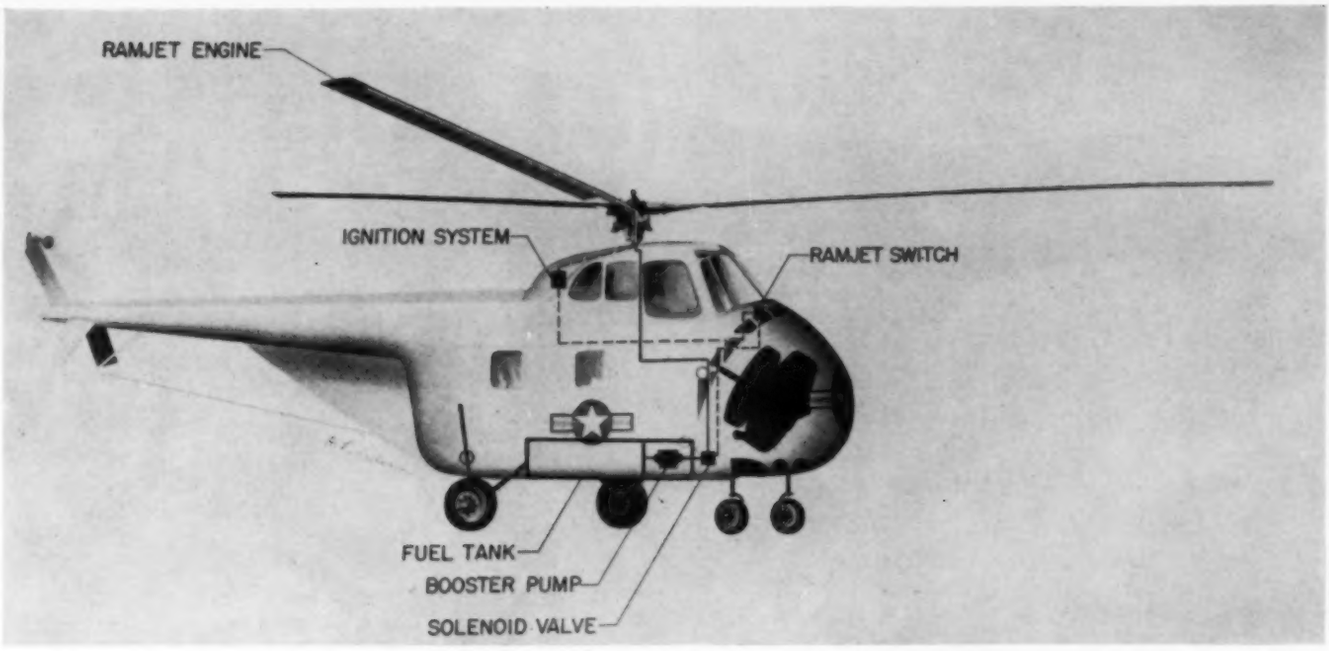
First application of the small engine, which has no moving parts, is installation on Army H-32 and Navy HOE-1 2-place liaison helicopters. Commercially designated as the Hiller HJ-1 Hornet, these helicopters are undergoing CAA certification, too, and are expected to complete the requirements near the end of 1954. Whether they will be marketed has not been decided.

The first CAA-approved power plant designed for tip-mounting on helicopter rotor blades, the Hiller 8RJ2B develops 45 hp. but weighs only 12.7 lbs. It is about the size and shape of a watermelon, being 21.3 ins. long and 8 ins. in diameter at its widest point. Pioneering problems were overcome in developing and certificating the power plant. The test for endurance was similar to that for most engines — 150 hrs. of test-stand time. Engine life expectancy can not be established until service experience is gained. High fuel consumption remains a problem. ★★★

Hiller HJ-1 grossing 1,210 lbs. with two 45-hp. tip-mounted ram jets is shown in flight. Chief Engineer Robert Wagner is shown below holding one of the engines. With him, left to right, are CAA Representatives Kenneth Beymer and Russell Van Note; Elbert Sargent, chief of propulsion; Harvey Holm, project engineer, and Edward Bennett, experimental hangar supervisor. —(Hiller Photos.)



Hiller ram jet has no moving parts and consists of a diffuser, radial flameholder, combustion chamber and exit nozzle. Initial ignition is by sparkplug. Tube of the ram jet is relatively cool in operation. —(Hiller Photo.)



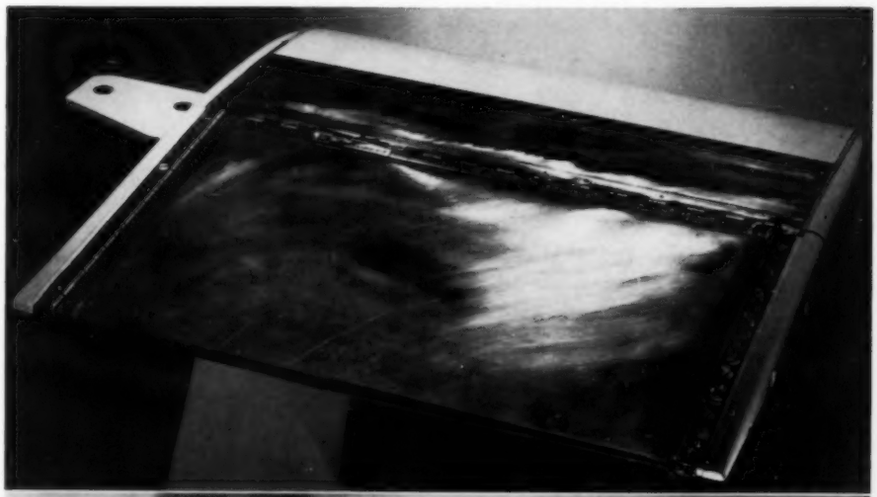
Installation of Marquardt ram jet boost system on a Sikorsky S-55.

Tip-Shaped Ram Jet

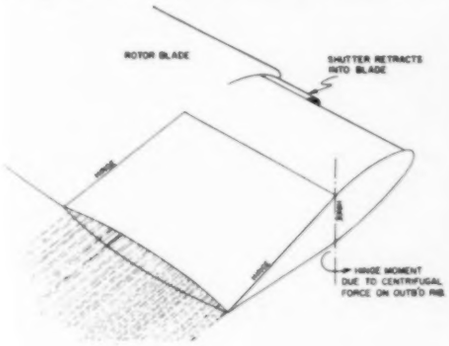
A tip-mounted ram jet engine for helicopter boost power has been developed by Marquardt Aircraft Company of Van Nuys, California, which can be integrated with rotor blades both aerodynamically and structurally.

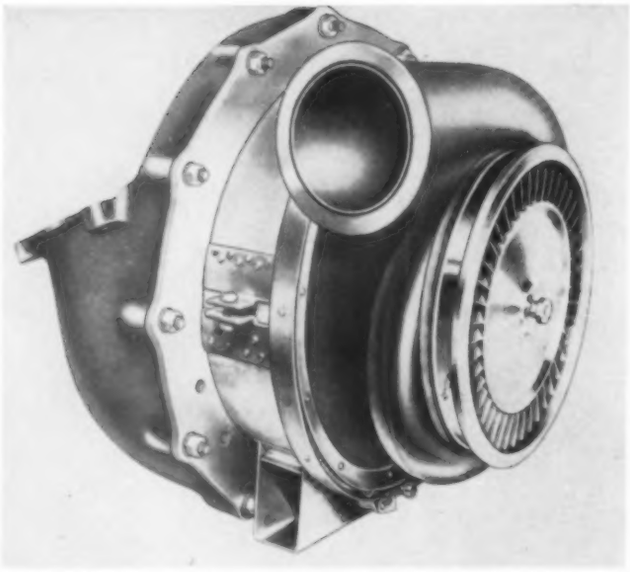
The engine is designed around a unique folding scheme which allows it to pop open for use during take-off or hovering and to fold "invisibly" into the airfoil when inoperative.

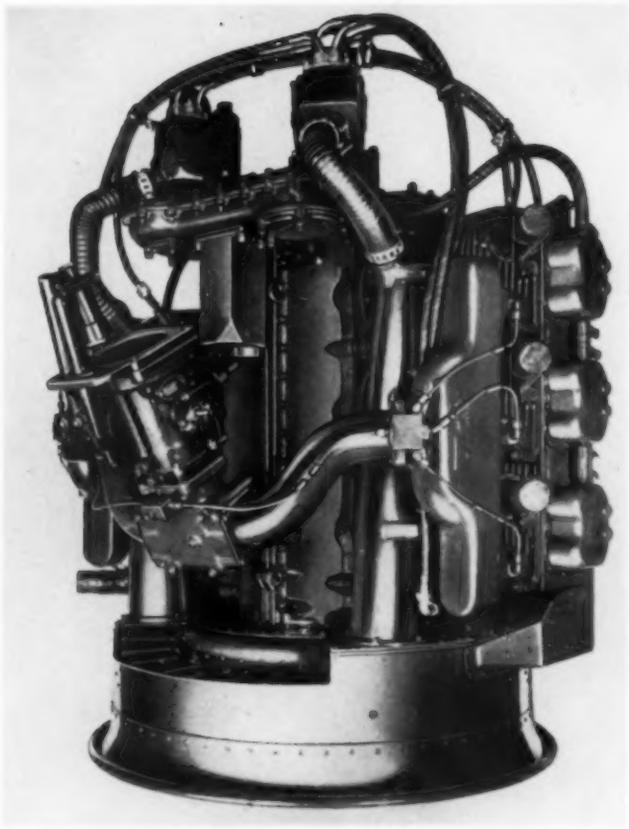
Robert T. DeVault, Marquardt engineer, said the engine adds only 4 or 5 pounds of weight to the rotor and will produce about 40 pounds of thrust at a tip speed of 650 ft. per second. Power-off drag of the engine will be about 3 pounds more than that of the rotor blade it replaces. He said three such engines on the tips of a 3-blade rotor would about double the payload for a 550-hp. helicopter having a 6,400-lb. normal gross weight. ★★★



Drawing shows how ram jet skin would flex in operation, with inlet shutter retracted into blade. Photos show test model of the engine, lower view with top skin removed to reveal flameholder, fuel nozzles and firing plug. Engine is 16.5 ins. long, has 15-in. span and is 2.5 ins. thick.







Small turboblower (above) for helicopter and fixed-wing aircraft engines operates at 38,600 rpm. It was developed by Aircooled Motors for its new Franklin 0-425-13 turbosupercharged engine (right). Engine dimensions are 38 3/16-in. length, 33 15/16-in. width and 38⅝-in. depth.

Franklin with Turbosupercharger

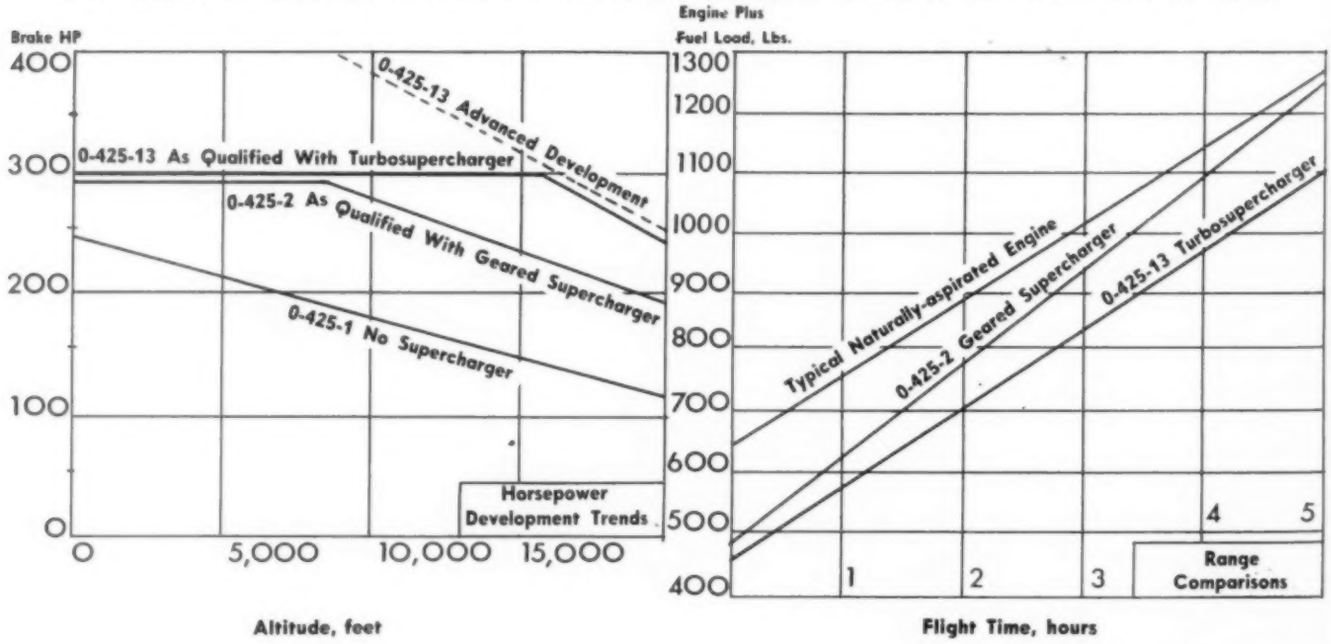
UNMATCHED efficiency in the small helicopter and fixed-wing aircraft field is claimed by Aircooled Motors of Syracuse, New York, for a new Franklin compound-type 6-cylinder "flat" engine equipped with an exhaust-driven turbosupercharger.

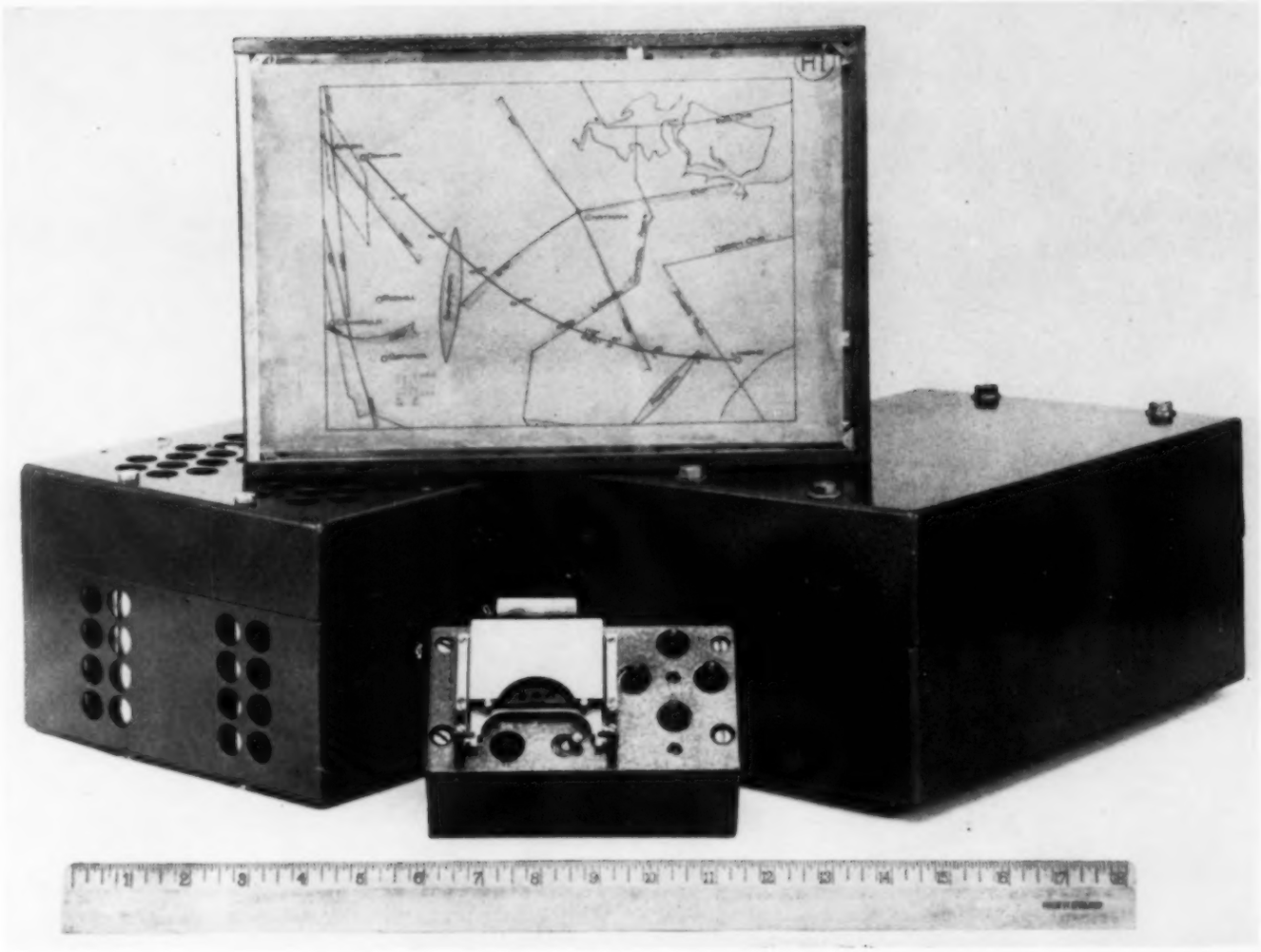
Designated Model 0-425-13, the new power plant is undergoing tie-down tests in an Army H-18 helicopter, preparatory to flight testing, but is also intended for fixed-wing aircraft. It has a take-off power rating of 300 hp. from sea level up to 10,000-ft. altitude with a normal rating of 285 hp. from sea level to 12,300 ft. In tests, it has developed over 400 hp. at sea level and higher ratings are expected without major redesign.

The turbosupercharger operates at a rated speed of 38,600 rpm. with 1,625-degree maximum allowable gas inlet temperature. A Bendix Eclipse-Pioneer regulator limits supercharger maximum speed and maintains at any altitude the manifold pressure selected by the pilot. The turbosupercharger will supply 40 inches of mercury ab-

(*Continued on page* 54)

Charts compare turbosupercharged Franklin with other models in horsepower at altitude (left) and in efficiency (right).





Dimensions of airborne Decca units are indicated by ruler. Small unit at center is control unit. Chart is on display unit, on which a pen continuously traces aircraft position and course as automatically computed from ground transmitter signals. Complete installed weight is about 36 lbs., according to Bendix, which will produce the system under Decca license.

Decca Navigation for Copters

THE versatile Decca Navigator System, used commercially in Western Europe by aircraft and coastal shipping since 1946, is being readied for production in America by the Pacific Division of Bendix Aviation Corporation and will be marketed as a navigation aid for all-weather helicopter operations.

Operating on low frequency radio waves which hug the terrain, the Decca system solves a major problem by permitting helicopter pilots to pinpoint their position continuously while flying at cruising altitudes or down low around buildings, hills or other obstacles which blank out high-frequency radio waves such as those used for conventional aircraft navigation and traffic control. It is considered a "natural" for metropolitan helicopter mail and passenger services such as those now operated at Los Angeles, New York and Chicago.

Palmer Nicholls, Bendix vice president and group executive, said Bendix will engineer the Decca system to U. S. requirements for manufacture and marketing here, under agreement with Decca Navigator Systems, Inc., of London. Bendix will produce both the ground transmitting and the airborne receiving equipment to government and industry specifications. The Decca airborne equipment is pictured on this page. Installed weight is about 36 lbs.

To serve a metropolitan area, a Decca system would consist of a "chain" having four ground transmitters about 70 miles apart. These would blanket an area of some 125,000 sq. miles with continuous radio wave signals which interlace, forming a grid pattern. Airborne equipment in a helicopter receiving these waves would automatically compare them and present to the pilot a continuous "motion picture" of his course and position by means of a line traced on a moving map, the system's display unit.

Decca allows any desired track or series of tracks, including delay paths and holding patterns, to be followed at will and it allows any desired point in the coverage to be approached from any direction. To the latter is added the flight log's indication of both the lateral displacement from a desired track and the rate of approach to that track, as well as its main function of showing at all times the aircraft's position on the map. The pen which traces the helicopter's flight path on the map in the display unit is mounted under the transparent chart and is moved

(Continued on page 54)

LEADERSHIP DEMANDS CONSTANT ACHIEVEMENT

BIGGER RADOMES FOR MORE PROTECTION. The radar Super Constellation picket plane is an extremely vital unit for U. S. protection. It can warn the nation hours earlier of enemy attack, because it has long range, high speed, plus six tons of electronic intelligence packed in radomes as big as swimming pools (like the bottom one pictured above).

WORLD'S FASTEST PROPELLER-DRIVEN AIRPLANE is turbo-propeller Super Constellation for the U.S. Navy (shown below). Now flying, it will be capable of speeds 100 mph faster than any propeller airplane now in service. Powered by Pratt & Whitney T-34 turbo-propeller engines, this plane promises new speed, new performance and greater economy potentials.

NEWEST TRANSPORT CONCEPT is Lockheed's C-130A turbo-prop assault transport, shown here in its dramatic first flight. Now in production at Government Aircraft Plant No. 6, operated by Lockheed's Georgia Division in Marietta, this giant plane literally jumped off the runway in one-third the distance required for today's commercial transports. This new cargo plane incorporates scores of new features for better handling of troops, materiel and equipment.

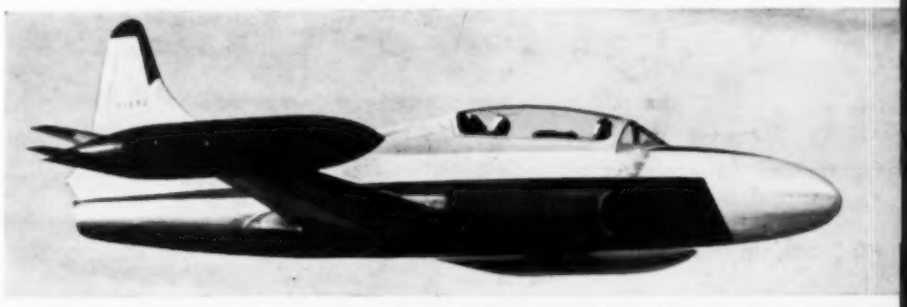
6 New Lockheeds for U.S. Protection

Powerful Team Includes Truly Amazing Jet Fighter, High-Speed Assault Transport and Vital Picket Plane

1954 has been a notable year for Lockheed, in research, development and production. Six new models in one year include: world's fastest propeller-driven transport; world's first turbo-prop assault transport; latest version of the Navy's Neptune anti-submarine patrol bomber; a new advanced jet trainer for the Navy, and a truly amazing jet fighter, the F-104 now in production, which is too secret to photograph or describe.

On these pages are shown all new models except the restricted F-104. Also photographed is the vital Super Constellation picket plane, with fantastic top and bottom radomes. The bottom radome, for example, creates between 30,000 and 60,000 pounds of drag pressure, yet to hold it securely in place only 10 bolts are needed, due to ingenious Lockheed design.

FLIES STRAIGHT UP, LANDS STRAIGHT DOWN. This is the Lockheed XFV-1 Vertical Ascender, a revolutionary new concept of aircraft developed in cooperation with the U.S. Navy. Now, every ship can have its own protective fighter umbrella, every back yard could become a landing field if needed.



NEW NAVY ADVANCED JET TRAINER. Often called the world's safest jet airplane, Lockheed's new T2V-1 advanced trainer for the U.S. Navy has so many new safety and performance features it can be used for carrier landing and takeoff and can utilize existing short fields for propeller aircraft. By training better jet pilots quicker, this trainer boosts Navy's ability to protect America. Another product of close Navy-Lockheed design teamwork.

ADVANCED GUIDED MISSILE SYSTEMS DEVELOPMENT

Eminent scientists, nuclear physicists, and engineers have joined forces at Lockheed's new Missile Systems Division in Van Nuys, California. Their mission is to solve the nation's prime defense problem, to give our armed forces *totally* reliable means of delivering our defensive and retaliatory weapons to their targets. To accomplish this vital task, Lockheed has appropriated $10,000,000 for a program of laboratory research and development.

Lockheed

AIRCRAFT CORPORATION

California Division—Burbank, California
Georgia Division—Marietta, Georgia
Missile Systems Division—Van Nuys, California
Lockheed Aircraft Service—Burbank, California
Lockheed Air Terminal—Burbank, California

LOOK TO LOCKHEED
FOR LEADERSHIP

NEWEST SUB HUNTER is the Navy's latest version of the Lockheed P2V Neptune Patrol Bomber, a rugged, radar-laden flying sentinel with many secret missions. Its primary job: patrolling coastal waters against possible enemy submarines. Note new jet engines for added speed, power.

View from Bell helicopter shows part of the display of business planes exhibited during seventh annual NBAA convention in Dallas last month. Airplanes worth $5,000,000 were shown by manufacturers and conversion centers.

Biggest NBAA Display

THE National Business Aircraft Association's seventh annual meeting in Dallas last month not only set a record with 450 registrations but its static display of business planes, which began as a modest showing of several models, turned into the greatest exhibition of corporation aircraft ever staged in America.

Every manufacturer of business planes was represented, some using the event to show new 1955 models publicly for the first time, and the industry's leading transport conversion centers sent their finest to be shown. These conversion centers have become a significant branch of the aircraft industry in recent years. One of them, Executive Aircraft Service of Dallas, exhibited its 100th multi-engine executive conversion, a DC-3, with all the newest developments in equipment and accessories as well as the latest interior innovations.

In all, there were display aircraft totaling over $5,000,000 in value.

Copter Taxi

Helicopter shuttle service between Love Field and downtown Dallas was a feature of the seventh annual NBAA convention, its members receiving the air taxi service as a courtesy of Bell Aircraft Corp., and two Hiller helicopter distributors — J. D. Reed of Houston and Hiller Helicopter Sales of Chicago. Shown are the 4-place Bell Model 47G-1 (above) and 3-place Bell Model 47H (right). Outfitted with plush executive interiors, they attracted a lot of interest.

—(Bell Aircraft Photos.)

DE HAVILLAND EXECUTIVE HERON has four 250-hp. engines for 183-mph. cruise, range of over 1,600 miles.

NEW BEECHCRAFT SUPER 18 cruises above 200 mph. and has many features which obsolete older Model D18S.

AERODYNAMIC REFINEMENTS OF LEARSTAR enabled it to average 315 mph. from Santa Monica to Dallas show.

$300,000 DC-3 IS 100th CONVERSION turned out by L. V. Emery's busy Executive Aircraft Service Co.

FIRST EXECUTIVE MARTIN 202 was on display. Below is roomy interior of **CONVAIR EXECUTIVE 340** (right).

SKYRAMA DC-3 FOR EXECUTIVES introduces new seat for passengers behind pilots for view out windshield.

TEMCO'S NEW RILEY TWIN 55 has 170-hp. Lycomings, auxiliary tip tanks. In picture is Mrs. Jack Riley.

PIPER APACHE WAS SHOWN TO PROSPECTS by W. T. Piper himself. Four-place Apache has 150-hp. Lycomings.

CAMAIR 480 TWIN-NAVION is advertised as cruising 192 mph. with 240-hp. Lycomings. Note tip tanks.

NEW 4-PLACE MEYERS 200 was shown for first time. It has 225-hp. Continental, sells for $17,500.

CROWDS WENT THROUGH AERO COMMANDER 560. Below is Kearney & Trecker's Lycoming-powered Royal Gull.

MOONEY MARK TWENTY was described by sign (below). With it are Hal Rachal, Bill Taylor, Norm Hoffman.

Special award recipients are shown above at NBAA convention. Left to right are Donald M. Stuart of CAA, who was cited for his many technical developments; CAA Administrator Fred Lee; NBAA Chairman Cole Morrow; and Manufacturers Rufe Amis (Aero Commander), Dwane Wallace (Cessna), W. T. Piper; W. P. Lear (Learstar) and Leddy Greever (Beech). Scrolls to manufacturers acknowledged their contributions to business flying advancement.
—(FLIGHT MAGAZINE Photos by Tom W. Collins.)

They ranged from the tiny Mooney Mite single-seater, which is widely used by businessmen, to an $800,000 executive Convair 340, and included the first new-production 4-engine executive transport offered on the market, the de Havilland Heron. Included, too, were two makes of helicopters for business fliers, the 3-place Hiller UH-12B and two brand-new Bell models being displayed for the first time, one a 4-place and the other a 3-place.

Four aircraft manufacturers — Aero Design, Beech, Cessna and Piper — and a conversion center — Bill Lear's aircraft division which is producing the new Learstar version of the Lockheed Lodestar — were cited by NBAA for their contributions to business flying and received NBAA awards. Top NBAA citation went to Donald M. Stuart, CAA director of technical development and evaluation, for his role in developing air navigation aids, airways traffic control devices, radio and electronic equipment and systems, and many other essentials basic to flying progress. Member corporations and their flight crews were cited in the usual safety awards recognizing accident-free operations.

An airline spokesman, Robert Ramspeck, vice president of Eastern Air Lines, and Seaborn Collins, American Legion commander, were principal speakers and urged support of business fliers in airline and air defense developments. It was pointed out that 2,500 multi-engine business planes are in operation and these far outnumber the 1,300-odd airliners operated by the carriers.

Henry W. Boggess, Sinclair Refining Co., Tulsa, Oklahoma, was elected board chairman of NBAA succeeding Cole Morrow, J. I. Case Co., Racine, Wisconsin. Other officers and directors elected are Ralph E. Piper, Monsanto Chemical, St. Louis, vice chairman; Gerald J. Eger, International Harvester, Chicago, secretary-treasurer; and Directors W. B. Belden, Republic Steel, Cleveland; J. B. Burns, Fuller Brush, Hartford, Conn.; Walter C. Pague, Armco Steel, Middletown, Ohio; and Delos W. Rentzel, Auto Transports, Inc., and Slick Airways, Oklahoma City and San Antonio. Jean H. DuBuque is executive director of the association with offices in Washington.

In addition to the aircraft display which featured the convention, there were displays by equipment manufacturers and other suppliers to the industry, both at the convention hotel and at Love Field. Some conducted flights in demonstrator airplanes. Collins Radio, for example, demonstrated its new tubeless automatic pilot and Bendix its new airborne radar system for business planes.

New aircraft displayed publicly for the first time at the big NBAA aircraft exhibition included the de Havilland Heron, Royal Gull amphibian, Beechcraft C-50 Twin-Bonanza, Mooney Mark Twenty, Meyers 200 and several new conversions, including the Learstar, Grand Central Aircraft's Skyrama DC-3, Pan American Air-

(Continued on page 56)

Helicopter view shows close-up of Beech C-50 Twin-Bonanza, Cessna 310 and Cessna 180 on display at NBAA show.
—(Bell Aircraft Photo.)

David Feltus, Chief Pilot for J. B. Michael & Co., Inc. seated at the controls of a D18 S, Beechcraft, one of the planes he flies for his Company.

Ask the men with the most experience . . . ask

DAVID W. FELTUS

Chief Pilot for
J. B. Michael & Co., Inc.
Memphis, Tenn.

"After fourteen years of flying, I realize more each year the value of good equipment and, equally important, of careful maintenance of your aircraft.

"As a regular user of Gulf Aviation Products for the last 13 years, I've learned to rely on them for efficient engine operation and longer engine life. I can recommend these products without reservation."

For safer flying, get acquainted with . . .

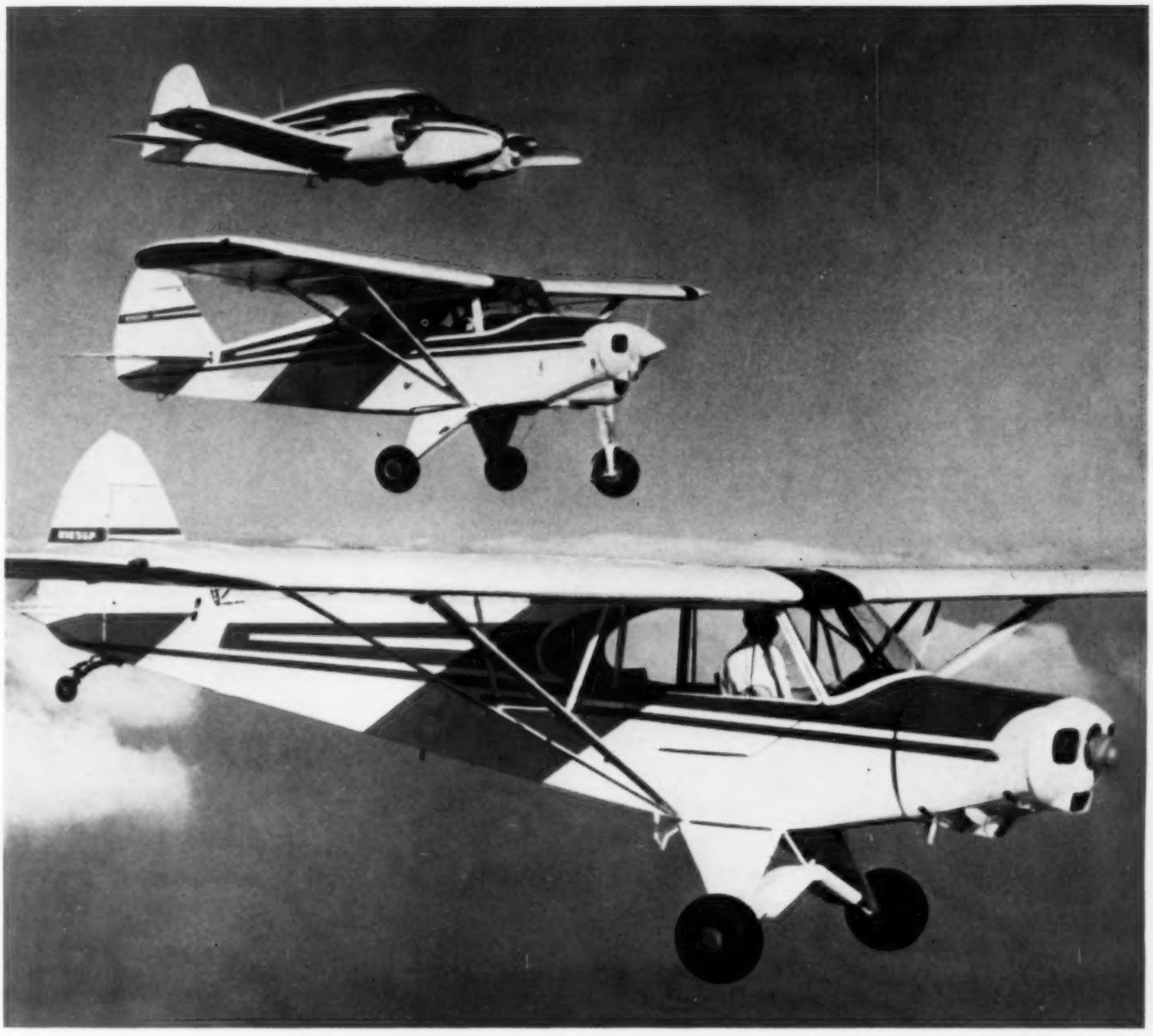
Gulf Aircraft Engine Oil, Series-R
For radial engines, or where a detergent oil is not desired. Approved by Pratt and Whitney, and other radial engine manufacturers, for all types of service. Retards sludge and carbon formation and retains its body at high operating temperatures.

Gulfpride Aviation Oil, Series-D
For horizontally opposed and Ranger in-line engines. Minimizes ring and valve sticking, oil consumption, oil-screen clogging and plug fouling. Users of this great detergent oil have actually increased periods between engine overhauls by as much as 100%.

Gulf Aviation Gasoline
"Refinery-clean" for your protection because Gulf dispensing units are equipped with advanced Micronic Filters.

GULF
AVIATION PRODUCTS

GULF OIL CORPORATION
GULF REFINING COMPANY



Pick your PIPER ...for '55

THERE'S ONE FOR EVERY PURPOSE

As pretty a line-up* as you'll see—the 1955 line of Piper planes.

ON TOP... the Piper Apache with 170 mph cruise, sensational single-engine performance, luxurious comfort... the perfect answer to the long-felt need for an economical twin for night and day utility.

IN THE MIDDLE... the wonderful new Tri-Pacer 150—more powerful, higher performance version of the famous Tri-Pacer, easiest-to-fly 4-place business plane on the market today and, by far, the largest selling in the lower-priced field.

FRONT AND CENTER... one of the world's most famous airplanes, the Piper Super Cub, now with 150 horsepower and 250 pound increased gross load... the most versatile airplane available for general utility and agricultural flying.

Little wonder more people have bought Pipers than any other plane in the world. What better assurance to you that you can't go wrong when you buy Piper?

**Taken at 9000' by Hans Groenhoff*

PIPER

AIRCRAFT CORPORATION

LOCK HAVEN, PENNSYLVANIA

Spray equipment on this Aero Commander can be installed or removed in a few minutes. Inset below shows lever operated by pilot to control density of fog and two large chemical tanks mounted in the cabin, with filler neck protruding outside.
—(FLIGHT MAGAZINE and Aero Design Photos.)

Commander Spray Kit

A PLUSH twin-engine executive Aero Commander purchased by the kingdom of Yemen has been outfitted by Aero Design and Engineering Co., of Oklahoma City so that it can double as a private miniature airliner fit for the king or as a spray plane for distributing poisonous chemicals in the kingdom's battle against crop-destroying locust hordes.

The dual-purpose Commander, first

(Continued on page 68)

Dallas Airmotive Salutes

THE

Helicopter Industry

ITS MANUFACTURERS AND USERS

Dallas Airmotive Now Overhauls

Bell and Sikorsky Helicopter Engines

for

The United States Air Force

The United States Coast Guard

Petroleum Bell Helicopter Corp.

Mohawk Air Lines

CAPABLE **DEPENDABLE** **RELIABLE**

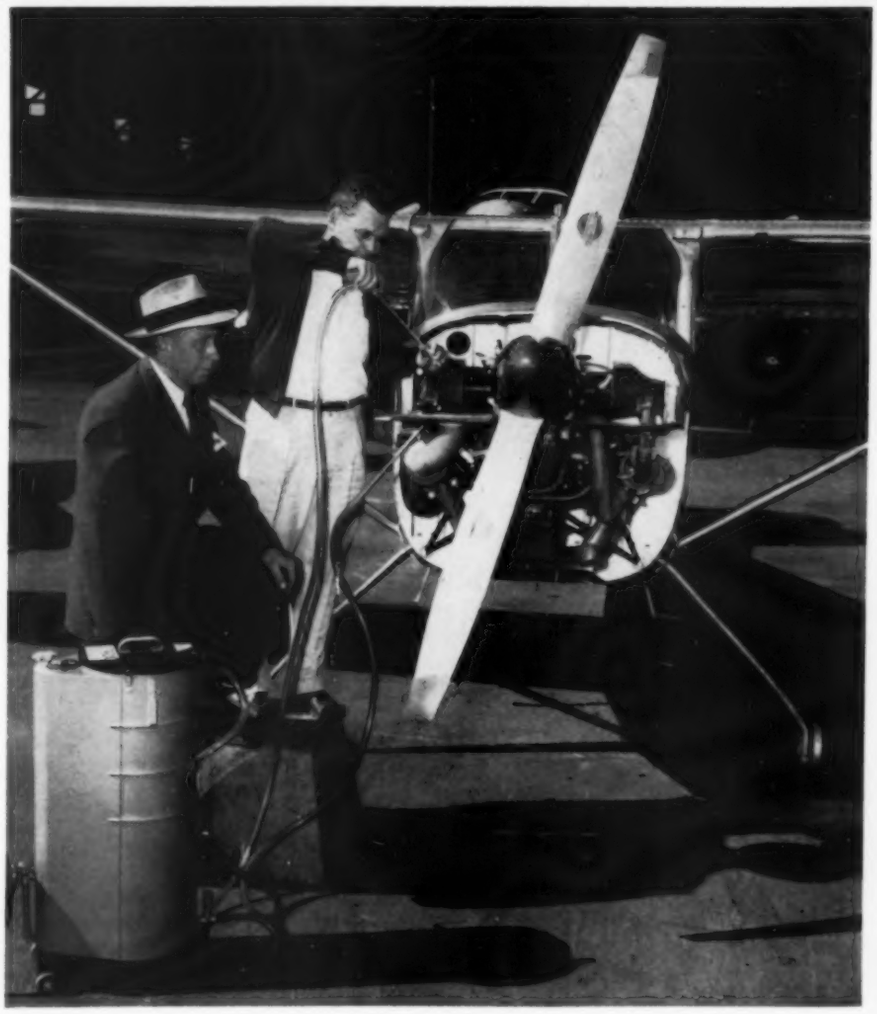
Dallas Airmotive Inc.
DALLAS TEXAS
6114 Forest Park, Dallas
RELIABLE ENGINES

CIVIL AERONAUTICS ADMINISTRATION REPAIR STATION NO. 3822
CLASS I AND CLASS II POWER PLANT RATINGS

We had a carbon blast demonstration at J. D. Reed's hangar. That's Bill Pierce of General Aviation Supply, Houston, feeding the walnut shells to our Continental 145 below while J. D. Reed looks on. —(FLIGHT MAGAZINE Photos by Bob Bailey.)

Blast That Carbon

By GEORGE E. HADDAWAY



WE have aged to the point where a delay on account of bad weather is no longer a source of irritation. Sitting around airports waiting for better weather can often prove profitable and enjoyable. Such was the case last month when Houston socked in tight and a visit around the various business houses on the airport led to the discovery of a new, economical way to smooth out a rough engine. It is done with an air cleaner that uses particles of walnut shells under strong air pressure to remove objectionable carbon and lead deposits inside the cylinders.

Ed Tucker and Bill Pierce of General Aviation Supply Company, one of the several national distributors of the new "Aero Power" cleaner, offered to back up their enthusiastic sales talk with an actual demonstration, to which we graciously succumbed.

With a couple of hundred hours on our new 145 Continental, we had discerned some slight roughness in recent weeks. Bill and Ed guaranteed to smooth it out and maybe increase our rpm.

Pierce loaded the cleaner on his pickup truck and off we went to the J. D. Reed Company hangar where Don Ramey quickly pulled the cowling and removed the spark plugs.

Sure enough, the inspection light inserted in the lower plug hole revealed plenty of "goop" on the cylinder walls, and a couple of them were in noticeably worse shape than others — visible proof of the slowly increasing roughness of recent weeks.

Pierce plugged his air hose into the compressor line, hooking his exhaust

(Continued on page 68)

The REED Forward LOOK

Year in and year out there is always something new at the J. D. Reed Company and it would pay you to drop in and find out about the REED FORWARD LOOK for 1955. For a quarter of a century we have taken pride in providing our customers with the newest advanced quality products and the finest in up-to-date service and maintenance. This traditional leadership has meant that our customers have always been the first to benefit from the new developments of the aviation industry.

As a part of the REED FORWARD LOOK for 1955—we announce the establishment of the Helicopter Division of the J. D. Reed Company. This division will offer complete sales and service facilities for the Hiller UH-12B Helicopter. All related helicopter services—including pilot training as well as charter and rental service—will be available to J. D. Reed Company customers.

J.D. REED CO., Inc.
SALES SERVICE Beechcraft
DISTRIBUTOR
MUNICIPAL AIRPORT
HOUSTON, TEXAS

Squared rear window identifies the 1955 model of the 4-place, 145-hp. Cessna. Tail-wheel steering has been improved and is more positive than formerly. —(Cessna Photo.)

New Cessna 170

SEVERAL improvements feature the 1955 version of Cessna Aircraft Company's 4-place Model 170, powered by a six-cylinder 145-hp. Continental engine.

Fifty of the new models were delivered last month in the first of several mass flyaways by distributors and dealers. Instead of a single annual sales meeting in January as in past years, Cessna this year instituted a series of smaller sales meetings beginning in November. Other meetings were scheduled for December, for distributors and dealers who did not make the first sessions.

The new 1955 version of the 4-place, higher-performance Cessna Model 180 was to be announced later in December.

No change has been made in the price of the new 1955 Model 170, which remains at $8,295 FAF, Wichita.

Tail-wheel steering has been improved and made more positive as one of several improvements in the new 170. Larger rear windows have been fitted to improve visibility and effect a slight change in appearance of the airplane. The 1955 model offers four flap positions, an additional 10-degree setting being new. The pilot now has 10, 20, 30 and 40-degree positions for landing and either 10 or 20-degree position for take-off. A recording tachometer and two new color com-

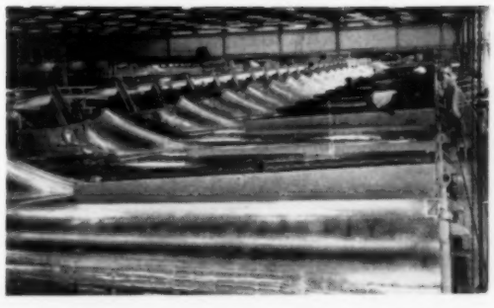
(Continued on page 69)

Some of the 1955 Model 170's delivered last month in a mass flyaway from the factory at Wichita. —(Cessna Photo.)

How TEMCO helps Boeing build B-47's

Thousands of man-hours of TEMCO's production skill are incorporated into the famous Boeing Stratojets performing so sensationally around the globe today. For over three years, TEMCO has been delivering aft fuselage sections to Boeing, Wichita. Proud to be associated with such an outstanding aircraft builder, TEMCO believes that such cooperation within the industry is a big factor in the Nation's defense potential.

Boeing is but one of the industry leaders relying upon TEMCO to help simplify production. Current contracts also include fabrication of major components for Convair, Lockheed, McDonnell, and Republic. TEMCO earned these contracts because of its established reputation for delivering a quality product, on schedule, at one of the lowest costs in the industry.



Rear fuselage sections for the B-47 Stratojet have been rolling from TEMCO's assembly lines since 1950. On the overhead conveyor assembly line shown above, final equipment items are installed in the components.

TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS

Plastic-impregnated Fiberglas moldings are used to cover this 4-place Taylorcraft prototype, which was flown recently at the factory. Two versions powered by 225-hp. Continental engines and a third version powered by a 145-hp. Continental will be marketed. —(Taylorcraft Photo.)

Fiberglas Taylorcraft

Reinforced plastic moldings replace doped fabric covering

LIGHTPLANES using molded fiber glass materials are to be produced at Conway, Pennsylvania, by Taylorcraft, Inc., which recently made the first flight of its "plastic" covered 4-place prototype.

The project will use Taylorcraft's conventional tubular steel fuselage structure and aluminum-and-spruce wing structure, but the coverings will be molded sections of Fiberglas, instead of doped fabric as formerly. The fuselage covering is molded into two sections, one for each side, which are joined together to form a complete shell. The wing coverings consist of eight molded units.

In addition to the fuselage and wing covering, the prototype's seats, doors, fuel tanks, wheel pants, cowl, instrument panel and other parts are also made of Fiberglas-reinforced plastic. Altogether, about 60 pieces of this material are used to form 15 units. Of the exterior surfaces, only the rudder and elevator are covered with fabric.

Ben J. Mauro, president of Taylorcraft, said the new process will offer substantial benefits to lightplane users. "The plane is less subject to damage than those of doped fabric or stressed-skin construction," he said. "Fiberglas-reinforced plastic skin will not dent, tear or warp and will withstand great impact. If a rupture should occur, it can be repaired with a can of resin, a piece of Fiberglas cloth and a putty knife. Removal and riveting of new bulkhead sections is not necessary.

"This type of plane material will not corrode, even from exposure to agricultural chemicals, and can withstand the elements without deteriorating, thus eliminating the need for hangaring. The strength of the skin provides a safety margin in case of an accident and thermal and accoustical properties are improved.

"Speed has increased approximately 12 mph. over the older model, due to the super smooth finish of the new material and there being no rivets exposed on the surface."

Mauro said the reinforced plastic airplane can be produced with one-fourth the engineering man-hours, one-sixth the production man-hours and 20 per cent of the tool and equipment costs required by an equivalent metal airplane.

He summed up by saying the reinforced plastic offered advantages such as flexibility of design, low tool cost, lightness in weight, favorable strength-to-weight ratio and speed from drawing boards to engineering and production reality. Since it is easy to mold a section with curves and bulges, the doors are curved out to provide 8 inches more shoulder room than formerly. Also, the fuel tanks are shaped to take advantage of all available space and as a result hold five gallons more than previously.

Interchangeability of parts is assured for production and service, since all of the reinforced plastic parts are made in dies or molds. If and when repairs are necessary, it is possible to make small patches. Or a large section can be fused together at any point that the repair might be desired by simply making a splice, Mauro said. Any portion of a part can be made in a die, so that if a customer needed only one-fourth of a fuselage, it could be made in the die and furnished to the customer for splicing together with the remaining section.

Three Taylorcraft models are to be produced with the new material. They are listed by the factory as follows:

RANCH WAGON—a 4-place in the $9,000 range and powered by a 225-hp. Continental engine.

SKY LINER—a 4-place powered by a 145-hp. Continental engine and priced in the $6,000 range.

TOPPER—an agricultural version with 225-hp. Continental engine and priced in the $9,000 range with dispersal equipment tentatively priced at $2,150.

The company says it is gearing for one-a-day production but could expand this to four or five planes per day. It expects to export 50 per cent of its production to foreign countries.

STOP
ON TIME

The B-47 Jet Bomber is built to GO and go it does with a speed that challenges the imagination (London, England to Limestone, Maine in 4 hours and 43 minutes) even in this day of supersonic speeds by smaller planes. But when it's time to come down, landing and stopping this 6-jet aircraft must be done with both accuracy and dependability. To accomplish this, Boeing Airplane Company uses Pioneer specially-built deceleration 'chutes to approach the runway and larger ribbon 'chutes to shorten the landing roll — a maneuver that has won the praise of the aviation industry — of which Pioneer is proud to be an integral part.

PARACHUTES MAKE THE DIFFERENCE!

PIONEER PARACHUTE COMPANY, INC.
MANCHESTER, CONNECTICUT, U.S.A.
Cable Address PIPAR

IN CANADA
PIONEER PARACHUTE COMPANY of CANADA LTD.
Smiths Falls, Ontario

Southwest Factory Branch • Love Field • Dallas, Texas

North, South, East or West . . . you can always place your confidence where you see the sign CERTIFIED BEECHCRAFT SERVICE. Modern facilities, experienced personnel and factory authorized parts offer assurance of service satisfaction. On your next trip visit the outstanding firms listed below.

AIRCRAFTCO, INC.
New Municipal Airport
Wichita, Kansas

AIRCRAFTSMEN, INC.
Will Rogers Field
Oklahoma City, Oklahoma

ALAMO AVIATION, INC.
Municipal Airport
San Antonio, Texas

ANDERSON AIR ACTIVITIES
General Mitchell Field, Milwaukee, Wisc.
Truax Field, Madison, Wisc.

ATLANTIC AVIATON CORP.
Teterboro Airport, (25 minutes from Times Square)
Teterboro, New Jersey
Logan Airport, East Boston, Mass.

BUTLER CO., AVIATION DIVISION
Municipal Airport, Chicago, Ill.

CURREY SANDERS AIRCRAFT CO., INC.
Downtown Municipal Airport, Shreveport, La.

CUTTER-CARR FLYING SERVICE, INC.
West Mesa Airport, Albuquerque, New Mexico

GRAY AIRCRAFT SVC. CO., INC.
D. A. Cody, Service Mgr.
Love Field, Dallas, Texas

HUNTER FLYING SERVICE, INC.
Hunter Field, Cedar Rapids, Iowa

ROD MORE AVIATION SERVICES
Cuddihy Field, P. O. Box 556,
Corpus Christi, Texas

ATLANTIC AVIATION SERVICE
New Castle County Airport, Wilmington, Delaware

ROSCOE TURNER AERONAUTICAL CORP.
Municipal Airport, Indianapolis, Ind.

J. D. REED CO., INC.
Municipal Airport, Houston, Texas

TOPEKA AIRCRAFT SALES & SERVICE
Municipal Airport, Topeka, Kansas

TRADEWIND AIRPORT CORP.
Tradewind Airport, Amarillo, Texas

TULSAIR DISTRIBUTORS, INC.
Hangar 8, Municipal Airport, Tulsa, Oklahoma

WINGS, INCORPORATED
Wings Field, Ambler, Pennsylvania
Philadelphia International Airport, Philadelphia, Pa.

On how many chill winter days have you wished for a few hours recreation in the warm sun?

On how many short weekends have you yearned for a few hours of relaxation away from it all?

The warm sun is only hours away

For thousands of busy men, ownership of a BEECHCRAFT has provided a new and better way of living. You travel where and when you want to go – on your own schedules – at your own convenience.

BEECHCRAFTS are the Air Fleet of American Business. Thousands of them are in use by the most wide-awake and aggressive corporations and individuals for the purpose of saving time. With a BEECHCRAFT, there's more time for work – more time for pleasure, too!

Beechcraft

Beech Aircraft Corporation,
Wichita, Kansas, U. S. A.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

AIRLINE OUTLOOK

(Continued from page 30)

instrument flight becomes routine we will have to develop an efficient system for the de-icing of blades and rotor heads.

Furthermore, a major problem will arise as far as airways traffic control is concerned. It is, in fact, impossible without losing the city-to-city speed advantages of the helicopter, to integrate it in the airways system of fixed-wing aircraft. One should definitely be separated from the other.

The best solution would seem to use the part of the space under the airway for the helicopter with a minimum altitude of 1,000 ft. above the ground, all flights being performed at the same level by means of lateral separations and with the help of a precise and low-frequency navigation aid, Decca type.

When two helicopterways cross each other, one route will cut the other, assuring safety at the crossing point, by a vertical separation of 500 to 1,000 ft.

Besides the Decca-type receiver, the helicopters should be equipped with airborne radar enabling them to check the longitudinal separations.

Fixed-Wing Replacement by 1960-65

The determining factor in the study of performance of the future helicopters is the dimension of downtown heliports. One can easily admit that for practical and economical reasons the greatest dimensions of a downtown heliport should not be larger than a city block. These maximum dimensions will determine the accelerated-stop distance of the multi-engined helicopter of tomorrow.

When hovering and climb will be possible with one engine out, only one problem will arise, that of parking.

What will be the evolution in the building of helicopters? One may believe that for 1956 single-engined machines carrying from 12 to 15 passengers and cruising at a speed of 100 knots will replace the helicopters now in use. Helicopters with several turbines carrying 18-20 passengers should be CAA approved around 1958, and will be used more and more for passenger services. This will bring about a sudden expansion of the helicopter networks. By 1960-65, multi-turbines will carry 40-60 passengers and cruise at about 200 mph., thus reducing the cost per ton-mile and replacing the fixed-wing aircraft on stretches up to 350 miles.

★ ★ ★

DECCA NAVIGATION

(Continued from page 35)

by two cursors, one horizontally and the other vertically. The cursors are drawn across the display unit by means of stainless steel fishing line. Included in the unit is a "memory drum" which allows an aircraft to fly off the map for up to twice the distance shown on the chart, while yet recording its position when returning to chart limits.

Most recent Decca Navigator development is the new lightweight Flight Log Type 352. It consists of four separate units. These are (1) the control box, measuring 6 by 3 by 3 ins. and weighing ¾ lb.; (2) the display unit, measuring 12½ by 8⅞ by 1⅜ ins. and weighing 5½ lbs.; and (3) two units almost identical in appearance, one the torque converter and power supply and weighing about 14 lbs. and the other being the light-weight receiver, weighing 16 lbs. — these units each measuring 12.5 by 8 by 6 ins. The display unit is easily stowed in a map pocket when not in use.

A further development of the Type 352 will be the new Type 720 designed for helicopters. Dimensions of its display unit will be 17 by 7 by 1⅜ ins., giving a 15 by 5-in. chart size. This new display unit will make possible the use of up to three separate scales on the same chart, consisting of an enlarged area showing take-off region, then the in-flight portion on a smaller scale, and finally another enlarged or "blown-up" landing section. By suitable linkage, speed of the cursor movement adjusts to whatever chart section it is traversing, automatically compensating for different scale sizes. Weight of the Type 720 display unit will be 7½ lbs. ★ ★ ★

NEW FRANKLIN

(Continued from page 34)

solute pressure at the carburetor inlet up to 16,000 ft., although the engine at present rating utilizes this boost only up to 10,000 ft.

Exceptional fuel economy is claimed as well as low specific weight and superior altitude performance. These result in increased payload and greater range. Benefits of turbosupercharging are indicated by Aircooled Motors in the following chart comparing three models of the basic 0-425 series:

Engine Model	0-425-1	0-425-2	0-425-13
Superchargers	None	Gear	Turbo
TO hp. sea level	245	300	300
Hp. at 10,000 ft.	172	285	300
Spec. Wt., Lbs./Hp.			
Sea level	1.51	1.62	1.55
10,000 ft.	2.15	1.70	1.55
Fuel Cons. TO at sea level lbs./hp./hr.	.61	.72	.55

Some of the basic data for the new turbosupercharged engine are as follows: Take-off hp. and rpm., 300 sea level to 10,000 ft. at 3,275; maximum continuous rated hp. and rpm., 285 sea level to 12,300 ft. at 3,275; specific fuel consumption, .55 lb./hp./hr. for take-off, .54 for rated and .45 for cruise at 60% rated; fuel, 100 octane; engine weight including fan and complete air housing for submerged installation, 420 lbs.; engine weight without fan and air housing but with reduction gear drive for fixed-wing aircraft, 405 lbs.; turbosupercharger weight, 36 lbs.; turbo regulator weight, 13 lbs.; specific weight of engine turbo combination for helicopter or submerged installation, 1.55 lbs. per hp.; specific weight of engine turbo combination for fixed-wing aircraft, 1.43 lbs. per hp. Engine dimensions are 38 3/16 ins. for length, 33 15/16 ins. for width, and 38⅝ ins. for depth.

★ ★ ★

TIE-DOWN TESTS OF A FOUR-ROTOR HELICOPTER PROTOTYPE began recently at Zahns Airport, Amityville, Long Island, New York. Shown is the Model A Quadrotor of Convertawings, Inc. It has two 90-hp. Continental engines in the fuselage, one fore and the other aft. An advanced 60-passenger design will use shaft turbines and gross 42,000 lbs. —(Convertawings Photo.)

Wishing all Beechcraft Customers...

1. D. A. Cody 2. Morris Edwards 3. Tommy Spence 4. Glen Whittington 5. Roy Stevens 6. Walter Mann 7. Andy Chandler 8. Evert Christie 9. J. T. Johnson 10. Charles B. Cox 11. C. E. Hogan 12. Jack Spain 13. R. B. Knight 14. M. D. Clark 15. Charles L. Johnson 16. George W. Bonin 17. Augustine Culpepper 18. C. C. Bauer 19. Robert Craddock 20. Don Ferguson 21. Ray Reiter 22. Jack Willis 23. Kenneth Bardin 24. J. T. Hutchins 25. A. D. Cooper 26. L. R. Bransom 27. J. W. Simmons, Jr. 28. Mrs. Elizabeth Weaver 29. Mrs. Dorothy Matthews 30. Mrs. Nell Morris 31. Mrs. Wanda Jenkins 32. Mrs. Grace Nuner 33. Mrs. Letha Poole 34. B. D. De Weese 35. Mrs. Pat Parker 36. J. R. Gray

CERTIFIED BEECHCRAFT SALES & SERVICE

Gray Aircraft Service Co., Inc.

LOVE FIELD DALLAS

Alabama Get-Together

Over 40 planes participated recently in a Sportsman Pilots Association air cruise to Point Clear, Alabama, and are shown above at Klumpp Airport. Members are shown at the Grand Hotel. Swimming in Mobile Bay, sightseeing in the hotel's cruisers, golf on its course and horseback riding were enjoyed. D. V. Gauss of Kalamazoo, Michigan, is president. George C. Wilkinson, Mobile member, made arrangements.

NBAA SHOW

(Continued from page 41)

ways' R-2000 DC-3, Super Widgeon, and Riley Twin 55 and Camair twin-Navion conversions.

The Heron is an executive version of the 17 passenger airliner powered by four 250-hp. de Havilland engines, but is outfitted with an 8-seat cabin and a 500-gal. fuel supply. At 183-mph. cruising speed at 8,000 ft., its fuel consumption is only 50 gals. per hr. The Heron, which was displayed, was flown across the North Atlantic to be used as a demonstrator by de Havilland's U. S. representative, Ian Fossett. It is priced at $198,850, fully equipped and including de-icing boots.

The Royal Gull is an Americanized version of the 5-place twin-engine amphibian developed in Italy by Piaggio and used by the Italian air force. It is powered by two 260-hp. Lycoming engines driving pusher propellers (Hartzell) and has a 172-mph. cruising speed with 205-gal. fuel supply for a 1,250-mile range. Priced at $65,000, it has been placed on the market by Royal Aircraft Corporation of Milwaukee, a subsidiary of Kearney & Trecker Corp.

The new 6-place C-50 Twin-Bonanza is a 1955 version by Beechcraft with increased horsepower and other refinements. Its Lycoming engines are rated at 275 hp. each for take-off, an increase of 15 hp. each over the 1954 model. Beech also exhibited its new Super 18 at the exhibition with its many new and well-known features.

CAA Administrator Fred Lee (right) was among NBAA conventioners enjoying the Dallas display of executive aircraft. He is shown here with Bill Lear (left) and Cole Morrow while inspecting the Learstar Lockheed. After the program, Lee returned to Washington in the Learstar with Lear.

—(FLIGHT MAGAZINE Photo by Tom W. Collins.)

Mooney Aircraft introduced the prototype of its 4-place Mark Twenty in the midst of its flight-test program and a changeover involving the use of a new 170-hp. 4-cylinder Lycoming engine instead of the 150-hp. Lycoming it carried. Its fuselage will also be metalized and its cabin made larger. Hal Rachal and Norman Hoffman, who recently acquired the company, and Bill Taylor, test pilot, used the biggest display sign seen at the show to proclaim the virtues of their new Mark Twenty. Among countless details, this sign priced the 170-hp. airplane at $12,500, gave its cruising speed as 175 mph. at 6,500 ft. and 70 per cent power, its fuel capacity as 52 gals. for a no-wind range of 1,020 miles, and listed its useful load at 1,100 lbs. with a 1,325-lb. empty weight. Production begins Jan. 1, 1955.

The new Meyers Model 200 4-place business plane attracted much interest. It bears resemblance to the Navion but its large cabin has a Bonanza-type door and its nose resembles that of the Bonanza. With a 225-hp. Continental engine, its cruising speed is said to be 185 mph. and its range 650 miles with 44-gal. fuel capacity. Gross weight is 2,850 lbs. with an 1,850-lb.

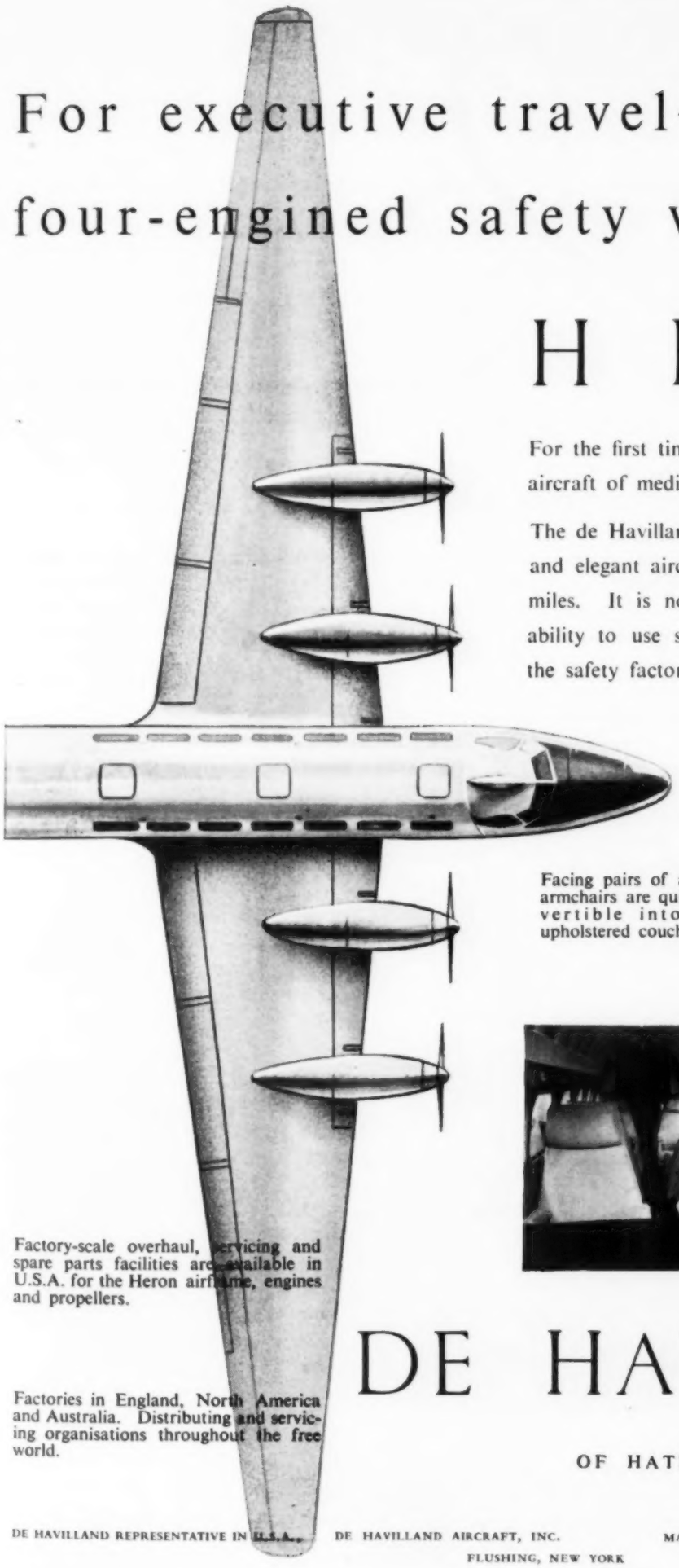
For executive travel—

four-engined safety with economy

HERON

For the first time, a completely new four-engined transport aircraft of medium size is available to the executive.

The de Havilland Heron is a modern, efficient, economical and elegant aircraft, for stage lengths of up to 1,500 statute miles. It is not too big and not too small; it has the ability to use small airfields and—very important—it has the safety factor of four engines.



Facing pairs of adjustable armchairs are quickly convertible into softly upholstered couches.

Standard executive arrangement seats eight in luxury. Folding full-width tables between chairs.

Factory-scale overhaul, servicing and spare parts facilities are available in U.S.A. for the Heron airframe, engines and propellers.

Factories in England, North America and Australia. Distributing and servicing organisations throughout the free world.

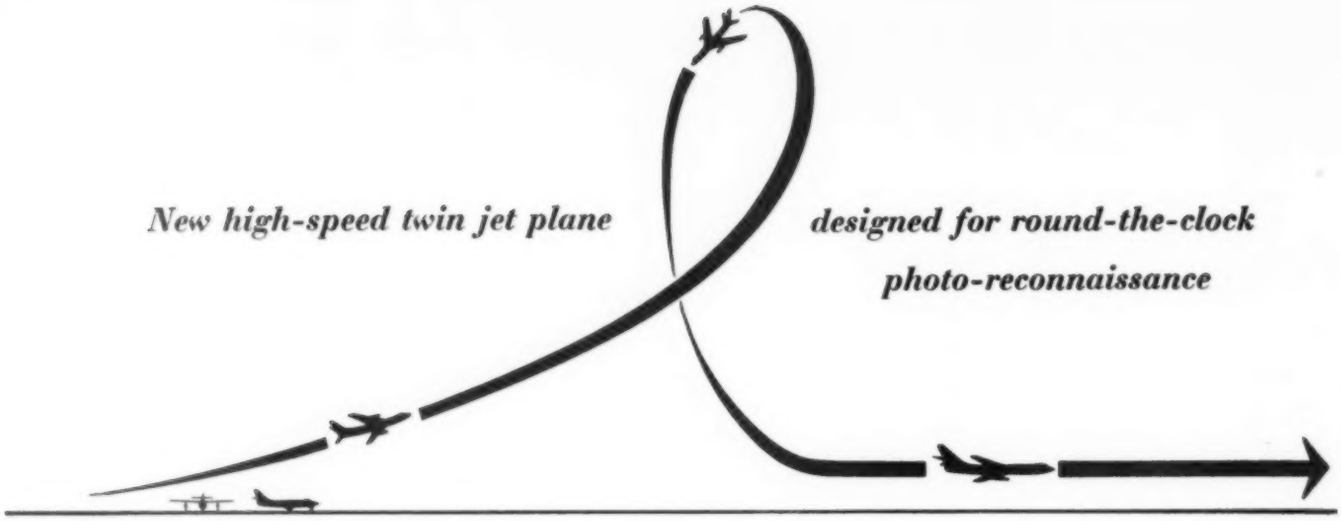
DE HAVILLAND

OF HATFIELD, ENGLAND

DE HAVILLAND REPRESENTATIVE IN U.S.A.: DE HAVILLAND AIRCRAFT, INC. FLUSHING, NEW YORK

MARINE AIR TERMINAL LA GUARDIA AIRPORT TELEPHONE: DEFENDER 5-3370

New high-speed twin jet plane *designed for round-the-clock photo-reconnaissance*



—the Douglas RB-66

Now in production for the U. S. Air Force, the Douglas RB-66 will be one of the most versatile photo-reconnaissance planes ever designed.

Complete performance data is still restricted, but this much can now be told. Powered by twin jets, slung in pods from its sharply swept wings, RB-66 will fly in the 600- to 700-mile-per-hour class. Range will permit deep penetration for all-weather, around-the-clock photo-reconnaissance or mapping. Photographic equipment will be of the most modern to collect detailed information by day or night.

Development of RB-66 is another example of Douglas leadership in aviation. Planes that can be produced in volume to fly *faster and farther with a bigger payload* are a basic rule of Douglas design.

Enlist to fly in the U. S. Air Force

Depend on *DOUGLAS* **First in Aviation**

empty weight. Its $17,500 price includes Hartzell constant-speed propeller, full instruments including gyros, and omni radio.

The new Learstar with its many aerodynamic refinements attracted much attention. Bill Lear and key members of his aircraft division staff, flew the Learstar nonstop from Santa Monica to Dallas at an average ground speed of 315 mph. A conversion of the widely favored Lockheed Lodestar, it has been changed so extensively as to be a different airplane. The display ship was Learstar No. 2. Half a dozen Learstars have been ordered by business plane users, Lear said. He also said he is well along in an engineering project aimed at pressurizing the Learstar.

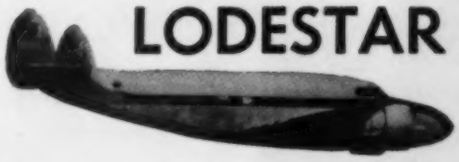
Grand Central's Skyrama DC-3 conversion introduces a new idea in executive transports — a "skyroom" compartment up front just behind the pilot and co-pilot and ahead of the radio and hydraulics equipment. This not only gives the crew the option of forward loading when wanted but gives the front compartment passengers a "forward view" through the cockpit windshield. They also have side windows. Two other passenger compartments are provided. One has two sofas large enough for conversion into sleepers, and the other is the main compartment in the rear, which features extra-large overstuffed chairs and a circular lounge, with plenty of table space for each passenger and large picture windows.

Long, Parker & Associates of Dallas, who are agents for executive Convair

NBAA helicopter acts staged by Bell Aircraft included simulated hoist rescue.

Today's
Businessman's
Blue Plate Special

LODESTAR



Just taken in trade on Super 92 DC-3
Now in Basic Overhaul
Will convert to your specifications.

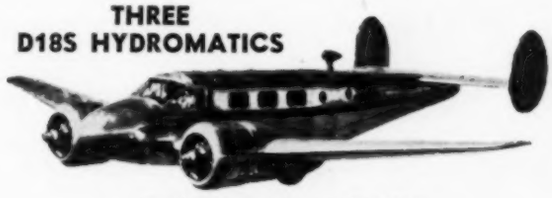
Here's Another
Super-92 DC-3

New ship guarantee, complete 8000 hour overhaul, SUPER-92 engines, Collins radio, beautiful custom interior, 200 mph. All have the new Remmert-Werner exclusive large cabin and picture windows for eye level vision.

We have five in production, and finish one every three weeks.

Remmert-Werner Is Now Installing
Bendix RDR Airborne Radar
First Time Available Commercially
See our demonstration installation in
Bendix's own DC-3
and our commercial installation in
Cornell-DuBilier's DC-3

THREE
D18S HYDROMATICS



Traded in on Super-92 DC-3

BONANZA

C-35 Like New
Full Equipment — Low Time
NTSO Engine

REMMERT-WERNER, Inc.
LAMBERT FIELD St. LOUIS, MISSOURI

Always Ready To Go

Hundreds of Cessna owners all over the country depend on the Authorized Cessna Service Stations listed below for their transportation needs—Authorized Cessna Service is their assurance that business planes are always ready to go, always in top condition for reliability, performance and comfort.

Every Cessna owner is guaranteed three important things by our factory-supervised Cessna Flat Rate Service:

(1) You get an accurately quoted price and time-required quotation based on hundreds of job studies covering virtually all maintenance needs.

(2) You get genuine Cessna parts and factory-trained workmanship.

(3) You save money and time and we stand behind every job for your fullest satisfaction.

To make the most of your Cessna's usefulness, visit the Authorized Cessna Service Stations listed below.

These progressive Cessna Authorized Service Shops offer flat-rate service.

Aircraft Sales Company
Meacham Field
Fort Worth, Texas

Champ's Flying Service
Municipal Airport
El Paso, Texas

Clinton Aviation Company
Stapleton Airfield
Denver, Colorado

Cruse Aviation, Inc.
Municipal Airport
Houston, Texas

Dal-Tex Aviation, Inc.
Highland Park Airport and Love Field
Dallas, Texas

Hair Flying Service
Harding Field
Baton Rouge, Louisiana

Howard Aero Service, Inc.
San Antonio International Airport
San Antonio, Texas

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Southwestern Skyways, Inc.
New Municipal Airport
Santa Fe, New Mexico

Kenneth Starnes Aviation Service
Adams Field; Little Rock, Arkansas

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

340 sales, displayed a corporate Convair 340 as the most advanced business plane in the show and the only one offering cabin pressurization. Major Bill Long said 16 Convairs are in executive use. He said No. 17 is being delivered to Continental Oil. It will be equipped with Bendix airborne radar. Executive Convair 340 price starts at $665,000.

The most completely equipped DC-3 at the display was an executive conversion by Executive Aircraft Service of Dallas. Representing an investment of some $300,000 to the Brown Paper Company of Monroe, Louisiana, this DC-3 is powered by Pratt & Whitney R-2000 engines developing 1,450 hp. each as compared to 1,250-hp. engines on most DC-3's. It also incorporates the modifications necessary for full use of the added power on take-off. Cruising speed is said to be 210 mph. Fuel capacity has been enlarged to give the airplane an all-out range of about 2,000 miles. Associated Radio of Dallas installed the radio and electronic gear for communications and navigations and the DC-3 carries all of the newest developments, most of it in dual installations. The Brown Paper DC-3 seats 12 passengers in its spacious cabin, with emphasis on simplicity of interior decorations. Full use was made of long picture windows. These give the interior an added appearance of spaciousness. L. V. Emery, president of Executive Aircraft Service, has specialized in oversize picture windows for DC-3's and Lodestars. ★ ★ ★

NEW ADMA OFFICERS are Jim Riddle, Narco (right), president, and Bob Northington, Piedmont Aviation (left), vice president, shown with Retiring President Larry Zygmunt, General Aircraft Supply.

There was plenty of entertainment for NBAA delegates. One of many prizes given at "cowboy stomp" was a parachute used as a "wrap" by the pretty girl shown above. Al Harting (at microphone) was master of ceremonies.
—(FLIGHT MAGAZINE Photo by Tom Collins.)

Dear Mr. Bell and Mr. Gaylord:
Congratulations on your new 47-H.
We are proud to have been selected to accomplish the interior of the industry's latest contribution to executive travel.

HORTON & HORTON

MEACHAM FIELD FORT WORTH, TEXAS PHONE MArket 3021

HELICOPTER PROGRESS

(Continued from page 29)

direct expense $1,060,962. Total direct operating expense was 76.99 cents per ton-mile for HAS, 169.18 cents per ton-mile for LAA and 191.25 cents per ton-mile for NYA. The cents per ton-mile indirect operating expense for the carriers was 61.16 for HAS, 71.82 for LAA and 150.30 for NYA.

In another modest experiment, a local service airline began token and seasonal helicopter passenger schedules during the summer. This was Mohawk Airlines, using a Sikorsky S-55. A trunk airline, National, had started local experiments in Miami last winter with an S-55.

All of the pioneering points to the need for large, multi-engine transport helicopters before full-scale airline operations can begin to develop passenger service in volume. These rotor transports are expected to be 20 to 60-passenger in size, with cruising speeds of at least 150 mph., before they offer reasonable seat-mile costs. Rumors have promised such designs from several sources but 1960 is generally conceded to be the earliest that city center-to-city center helicopter service will come into its own. One such design now widely discussed is a Douglas Aircraft study for a possible DC-3 replacement for airline operators. It would be a 40-passenger transport, powered by two turbines of 4,000 to 5,000-hp. each shafted to two rotors, one on each wing with a pusher propeller in the tail. Of Convair 340 size, it would cost as much or more. But it is a design study only at the present and the management at Douglas has not yet decided to develop it. No commercial orders for multi-engine helicopter transports have been placed by any airline, with any manufacturer, as of Dec. 1, 1954.

Helicopter operators are well advanced in planning for the future utilization of rotary-wing aircraft. The Air Transport Association of America, industry organization of scheduled airlines, has a special rotorcraft committee which has been engaged in exhaustive studies for some time now, and the International Air Transport Association (IATA) has a well-organized international working group of commercial helicopter operators engaged in thorough planning.

The IATA group held its first sessions last month in Montreal and is headed by Anselme Vernieuwe, vice president-operations of Sabena Belgian Airlines, which established the first international helicopter passenger schedules a year ago. The IATA group consists of operators representing many different types of helicopter operations. Enterprises represented at the first session, with names of their spokesmen, included the following:

Avianca (Colombia), R. Livingstone; British European Airways, Capt. J. W. G. James and B. S. Shenstone; Cleveland (Ohio) Air Taxi, K. C. Bolton, J. R. Garfield and C. T. Strachan; Helicopter Air Service (Chicago), C. W. Moore; Hunting-Clan (Canada), Paul Y. Davoud; KLM Royal Dutch Airlines, J. C. P. Stuy; Mohawk Airlines (New York), Dave Postle; New York Airways, H. Brock, R. L. Cummings, Jr., and J. E. Gallagher; Okanagan Helicopters (British Columbia), G. W. McPherson; Philippine Air Lines, J. H. Kinkade; Port of N. Y. Authority, T. Sullivan and M. A. Warskow; Petro-

Airmen's Calendar

Dec. 17—Wright Day Dinner, Statler Hotel, Washington, D. C.

Dec. 17—Eighteenth Wright Brothers Lecture, Bo Lundberg, Aeronautical Research Institute of Sweden, Lecturer, U. S. Chamber of Commerce Auditorium, Washington, D. C. Lecture to be repeated on Dec. 20 in Los Angeles and on Dec. 22 in Cleveland, according to Institute of Aeronautical Sciences.

Jan. 19-23—Miami International Aerorama, Miami International Airport.

Jan. 24-28—23rd Annual Institute of Aeronautical Sciences Meeting and Honors Night Dinner, Hotel Astor, New York.

BEAVERS in industry
In the Canadian west and the U. S. southwest, Beavers as a tool of the oil industry are working daily . . .
• Moving Men & Equipment
• Exploration
• Pipe Line Patrol . . .
on
WHEELS . FLOATS . SKIS
CF-GCU
THE
INDUSTRIOUS
Beaver
We welcome your inquiries
D346A
DESIGNED AND MANUFACTURED BY
THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED
POSTAL STATION L
TORONTO ONTARIO

leum Helicopters (New Orleans), R. L. Suggs; Sabena Belgian Airlines, Anselme Vernieuwe and J. Naome; Trans-Canada Air Lines, E. Berry, George Edwards and C. W. Johnstone; United Helicopters (Newfoundland), J. C. Charleson, and Air Transport Association of America, Donald Talmadge.

This group believes that transport helicopter development must be tailored to fit available helicopter landing areas, rather than vice versa, as in the development of fixed-wing transports. Most helicopter airline operations penetrate city centers, where space is limited.

Vernieuwe said the group hopes to provide manufacturers with operational data and specifications of operators' needs to serve as a reliable basis for future designs. "We now have, probably for the first time in commercial aviation history, the opportunity to set up a completely new policy and do away with the old administrative complications which, in fixed-wing operations, have too often been considered before the operational necessities for them developed. Regulation of helicopter operations should not become rigidly fixed before experience proves the need for regulation and the most desirable ways of applying it. We find the helicopter is making its own rules, day by day."

Specific data and recommendations will be reported by the IATA group at a meeting late next February in Brussels.

With operators voicing their needs and manufacturers developing machines to fit these needs, helicopter utilization should be perfected far more rapidly than was the case with fixed-wing aviation.

In commercial helicopter sales, Bell Aircraft leads the industry. As of November, its commercial sales were 20 per cent ahead of last year's record. Twenty-five new commercial helicopter operations had been started with Bell machines, including charter services in the metropolitan areas of Seattle, Dallas, Pittsburgh, New Orleans, Philadelphia, Fort Worth and Cleveland. Bell has over 40 helicopter sales representatives and dealers in 60 countries. Two overseas concerns are licensed to manufacture the Model 47G, one in Tokyo, Japan, and the other in Milan, Italy. More than 340 Model 47-series Bells have been sold commercially (includes foreign military and government agency sales) since this series was CAA-approved in 1946. Of the estimated 3,000 U. S.-made helicopters produced to date, Bell's military and civilian production can account for about 1,500 of them. ★ ★ ★

HUGHES AIRCRAFT'S GIANT AIR FORCE XH-17 helicopter made another test flight recently. It is powered by two General Electric TG-180 turbines and utilizes tip nozzles.

Since the inauguration of its

Air Mail Service

on August 20, 1949,

Helicopter Air Service, Inc.

has flown more helicopter miles

without accident than

any other company in the world.

HELICOPTER AIR SERVICE, INC.

3036 W. 63RD STREET — MIDWAY AIRPORT

CHICAGO 38, ILLINOIS

Questions and Answers for Airport Operators

Something About Airports, Small Ones Especially

IN 1949, reports had it that there were 6,484 airports in the United States. Beginning in 1950, the number gradually declined until it reached a low of 6,042 in 1952. Now comes the latest report on airports and it shows they have rebounded to an all time high, 6,760.

During the period of declining numbers there was considerable alarm. The percentages quoted made things look mighty black for the airport business. Actually the percentage was very low when analyzed from a standpoint of communities left without an airport by the defections. Many of those which closed left the communities served fully accommodated by other airports. Some were closed by the encroachment of housing developments and by the hazards of enlarged city limits with the rising values of land and the same in taxes.

That same analysis showed that very few of those which ceased to exist were publicly-owned airports. Most of these were replaced by more suitable public airports. Some public airports, too, returned to the military. The main cause of the decline appeared to be the decline in fixed-base operators' business and income on privately-owned airports.

When an operator decided that he would close up shop when the GI income disappeared, he likewise returned the land to other use. He could not be expected to keep his private airport open after it became no longer a place of business for him. If he had operated from a publicly-owned airport, his departure from the business would not have affected the airport unless he were the only operator there. That would have meant that there would usually be no service there unless the public agency owning the airport was minded to put an employe on the airport to serve the public, and many did do that.

Those public airports which either lost their operators or were completed about the time business got bad and as a result could not find operators, became sources of considerable worry to their owning agencies and in many cases the communities looked on them as white elephants.

Now we hear that the number of airports has reached an all time high. That's fine but it still is not the important thing in the airport picture. The actual number of airports is not nearly as important as is the factor of planned distribution of airports necessary to serve the public adequately, and with the services necessary to effect that service.

We know that in most large concentrations of population there are not enough airports to serve fully the needs of those who own or want to own and use aircraft. We know, too, and that means you also, that in hundreds of smaller communities there are airports which can be counted but which do not provide even the essential services. So we think it is not the number of airports that counts. The important thing is the location and the facilities necessary to serve public needs.

However, there is this heartening sign in the increase. It means business is justifying additional airports. And if that is the case it presages a revival of interest which will breathe some life into many of the dead and half-dead airports which have plagued their communities with doubts as to the wisdom of building airports. Signs of this revival appear everywhere we go. Here an airport that had four

As the year 1954 draws to a close and the holiday season approaches, we would like to take time out to say a word of thanks to our many friends and customers who have made our many years in business such a pleasure. We are deeply grateful for the opportunity of knowing and serving you and we look forward to many more years of our association.

To you, from all the folks at AIRCRAFT SALES COMPANY, we wish this to be your happiest Christmas ever and your weather CAVU as you take off into the NEW YEAR.

AIRCRAFT SALES Company

MEACHAM FIELD FORT WORTH 6, TEXAS

based aircraft two years ago has a dozen today. At another place we find an operator where there had been none for four years.

One town we know, a small town in a wealthy western county, had a newly built airport five years ago with not an airplane on it. Last year the owner, the county, built a hangar. Now there is an operator there and several aircraft. The hangar was the key.

In another town, this time in Oklahoma, five years ago an airport complete with hangar in a good town had no operator, one active aircraft, two inactive. That was the sum of aviation in that town. About three years ago they got a part-time operator whose family lived on the field so his wife could keep the hangar open and the gas pump available. We hear now that they need more hangar space. An operator was the key there. We know the town and feel that the potential was always there. These are not isolated cases. They represent the results of a steady and healthy growth in aviation based on utility in business and agriculture.

Conversely, there is the town we visited a few weeks ago and found only two privately-owned aircraft and six Stearman dusters on an airport well supplied with hangars. There had been forty aircraft there only three years ago. Here's what had happened. Two years ago that town deeded its airport to the government because an Air Force base was in prospect. After two years, reconstruction of the runways has just started for the air base but aviation has died because of the uncertainty of facilities for civil aviation. No provision was made for joint use although it is being considered now.

There are signs of the upturn in general aviation in many places, even along the roads. We were riding in a car through Ballinger, Texas, the other day — yes, in a car — and on the far side of the town we spotted a sign, and it could not be missed, which marked the side road that turned off to the airport. At the bottom were the words "Courtesy of the Jaycees." We like that. All forces are active now for not only a healthy increase in airports but also for the re-energizing of many of those which have ceased to serve the public. The tools necessary to fashion that change are simple ones, i. e. hangars, telephone, aviation fuel, and some public interest. Those are in addition, of course, to the necessary landing facilities.

In the large centers of population, the need, and it's a crying one, is principally for hangar space. That takes public interest, too.

National Airports Conference

Airport and aviation people from 22 states were in attendance and well rewarded thereby at the 1954 Na-

SPECIFY

Quality CONTROL

When you designate Aero Precision for

AIRCRAFT INSTRUMENT / ACCESSORY OVERHAUL WITH LAB TEST EQUIPMENT

you are specifying Quality Control! Paralleling production steps of each department is a system of close inspections . . . before, during, and after work . . . to insure finest workmanship and conformity with accepted factory standards. Aero Precision guarantees strict compliance with manufacturers', CAA and Army-Navy specifications. Flat or exchange rates prevail. Please write for details. Always specify **quality-controlled** overhaul, guaranteed by Aero Precision.

CAA APPROVED REPAIR STATION 3835
Aero PRECISION INDUSTRIES
OKLAHOMA CITY
FACTORY APPROVED SERVICE

INSTRUMENTS
ACCESSORIES
ELECTRONICS
TEST EQUIPMENT
DIALS and ENGRAVING

P. O. Box 5117 • Ph. ME 2-4418 • Okla. City 7, Okla.

CAA APPROVED FOR — INSTRUMENTS, CL. 1, 2, 3. — ACCESSORIES, CL. 1, 2. — LANDING GEAR COMPONENTS, LIMITED — MAGNETIC & FLUORESCENT INSPECTION, LIMITED

AUTHORIZED SALES & SERVICE FOR THE NATION'S LEADING MANUFACTURERS

FLY with CONFIDENCE

...behind a constant-speed Airliner Met-L-Matic propeller by McCAULEY

From hub to tips the new Met-L-Matic propeller is engineered to put confidence into your flight. Available for 0-470 Series engines, feathering and non-feathering models. Check its outstanding features and make it a must to fly behind an Airliner Met-L-Matic at your first opportunity. *Like riding on a cloud!*

✔ Check these features

- *Sealed-in, factory-lubricated, pitch-changing mechanism.*
- *No pitch-changing parts exposed to weather.*
- *Hydraulically operated. Holds RPM accurately without wavering or surging.*
- *Forged Aluminum Alloy hub and blades for high strength — low weight.*

Better Design Means Minimum Maintenance and Lower Operational Cost.

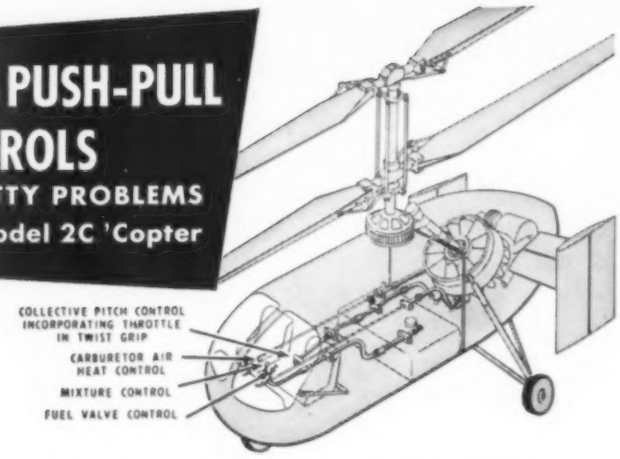
McCAULEY INDUSTRIAL CORPORATION
1840 HOWELL AVE.
DAYTON 7, OHIO

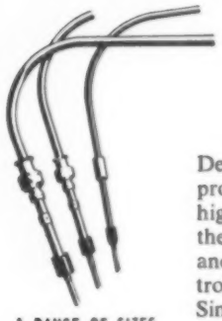
AIRLINER MET-L-MATIC FORGED STRENGTH McCAULEY

"World's largest maker of metal propellers for personal and business aircraft . . . more than 40,000 Met-L-Props, and now the new Met-L-Matic."

SIMMONDS PUSH-PULL CONTROLS

SOLVE 6 KNOTTY PROBLEMS In Gyrodyne Model 2C 'Copter


COLLECTIVE PITCH CONTROL INCORPORATING THROTTLE IN TWIST GRIP
CARBURETOR AIR HEAT CONTROL
MIXTURE CONTROL
FUEL VALVE CONTROL



A RANGE OF SIZES, VARIETY OF FITTINGS

Designers of this advanced coaxial rotor helicopter had these problems in laying out the engine controls of this ship: constant high amplitude, low frequency vibration, confined space aft of the firewall, unusual position of the carburetor beneath engine and a requirement for minimum backlash and easy working controls under little leverage. All these requirements were met by Simmonds Precision Push-Pull Control Systems—one of a long list of successful applications of Simmonds controls on advanced helicopters and other military and commercial aircraft.

Write for detailed information on Simmonds Precision Push-Pull Controls.

Simmonds AEROCESSORIES, INC.
General Offices: TARRYTOWN, N. Y.

Branch Offices: GLENDALE, CALIF. • DALLAS, TEXAS • DAYTON, OHIO • SEATTLE, WASH.
Sole Canadian Licensee: SIMMONDS AEROCESSORIES OF CANADA, LIMITED, MONTREAL

EXECUTIVE AIRCRAFT OF THE YEAR

CONVERSION NUMBER

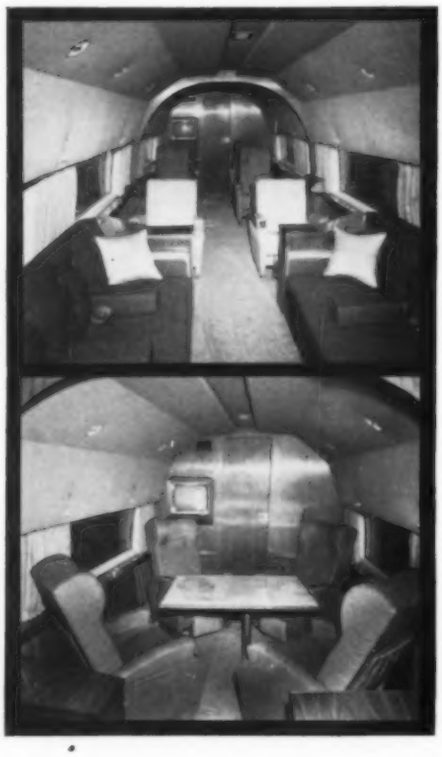
100

A spacious, luxurious cabin is only one feature of our Conversion 100. It is the safest DC-3 in the air today.

Powerful R-2000 engines, auto pilot and engine analyzer add to its dependability.

Executive Aircraft Service has completed more business aircraft conversions than any other company. The reason is that our customers are satisfied.

Wire or call today for further information.



EXECUTIVE AIRCRAFT SERVICE, inc.
L. V. EMERY, President FAirdale 2675
P. O. BOX 7307 • DALLAS, TEXAS • (GARLAND AIRPORT)

tional Airports Conference held October 13-15 on the campus of Oklahoma University at Norman, Oklahoma. The sponsors were the University and the American Association of Airport Executives.

Senator A. S. Mike Monroney of Oklahoma drew applause with his realistic views on the problems of local service airlines. The audience discovered a rare sense of humor and heard a story of faith in general aviation and in people in a talk by Claude Hutcherson, Plainview, Texas, on "Selling Aviation in a Limited Market." Fred Lee, Administrator of Civil Aeronautics, provided needed information on air-carrier aircraft developments. Herbert Howell, Director, Office of Airports, C. A. A., Washington, discussed surplus airports.

Other subjects discussed by an excellent array of speakers included maintenance, airport management, selling, traffic control, the Air National Guard, and the effect of CAB actions on airports.

The banquet speaker was Gill Robb Wilson, editor and publisher, Flying, New York City, whose vigor and spirit always seem to transmit themselves to those who listen to him. No one wanted him to quit talking.

Comments from those who attended the Conference confirmed the wisdom of the sponsors in reopening the series of Norman Conferences which was broken by the cancellation of the 1953 Conference. Next year the Conference will again be held early in October.

Just An Idea

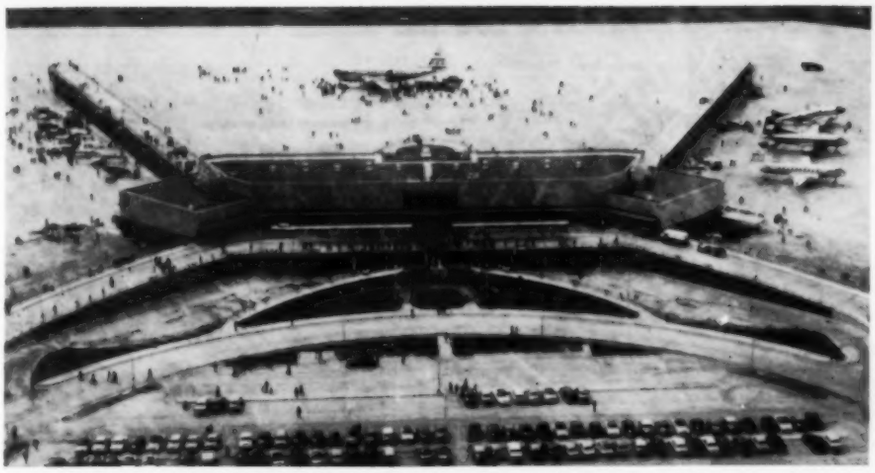
In this day and age, with a growing Air Force and with the Air National Guard increasingly active, many airports find a considerable problem in the joint use that such activities entail. In some cases, the high density of military use is transient, as at El Paso International. At many places National Guard aircraft are based and occupy large areas of apron when not being flown.

At other points, joint-use leases have been set up to afford more bases for training away from established Air Force bases.

Many such civil airports find it to their advantage to fill these use needs because civil use is only moderate. By helping fill military need they create greater use for their facilities and some revenue to help defray maintenance and operating expenses insofar as the landing area is concerned.

There is, however, a little-understood danger to civil aviation in such operations and we do not in any sense mean hazard. We refer to the reluctance of pilots to go into airports which appear to be military operations from the nature of the traffic or from the number of military aircraft parked about. That seems to be the feeling of many itinerant pilots.

We like to talk to airport managers and the other day we were shooting



NEW $5,000,000 HOUSTON INTERNATIONAL AIR TERMINAL was formally dedicated at the end of October with special ceremonies and the second annual Houston Jaycee air show. The new terminal, located two miles northeast of the old terminal building on Municipal Airport, contains over 100,000 sq. ft. of floor space and is completely air-conditioned. Four levels are used and facilities include 13 "roomettes" for stop-over air travelers. Bottom level contains flight operations, Post Office, Customs, Immigration and Public Health offices. On the main level are airline ticket offices, a nursery for children, a dining room, television lounge and passenger services. The third level is a glass-enclosed observation area, topped by the roof-level flying observation deck. Dual double-level fingers provide ramp space for 16 airliners using 30 acres of concrete, with underground service tunnels. An inclined driveway ramp enables autos to discharge passengers on the second level at the main street side entrance. Parking for 1,000 cars is provided out front.

—(Houston Chamber of Commerce Photo.)

the breeze with Dennis Humphreys, all about this particular problem. Dennis is the manager at San Angelo, Texas. We worked out a couple of ideas. We wonder if they aren't worth trying. If you have such a problem, let us know what you think of these and add any other ideas you may have.

1. In the office, the terminal, the hangars and by the gas pumps put up placards reading something like this:

"WELCOME TO HELENBLAZES MUNICIPAL AIRPORT — Sure we've got some military traffic. We are helping the defense effort but we want you to come back as often as you can. We can take care of you better because of the added activity. COME SEE US AGAIN."

2. If you keep a log of visiting aircraft or can do it from your gas tickets, mail your visitors a reminder to come back. Whatever mailing piece you use for this, change the format every few weeks so a frequent transient visitor won't tire of receiving your mail.

3. If you can raise the jack, paint a sign on your apron big enough to be read from the air: "Welcome Civil Aircraft." We thought of that after we left San Angelo, so we don't know whether Dennis likes it or not.

4. If military aircraft are parked on your airport, arrange to have that parking in such a location as not to block civil movement or not obscure the location of civil operations and fueling services.

We found an airport a short time ago where parked Air National Guard aircraft near an operator's hangar were said by that operator to have caused visitors to avoid his operation because it looked like a military operation. Could be, too, from the way it looked to us.

Merry Christmas to all airport managers and operators everywhere.

Helicopters for Lease

BY TRIP-JOB-YEAR

SIKORSKY S-51 and S-55

With or without crews and maintenance. For complete information wire, call or write

LOS ANGELES AIRWAYS, INC.
INDUSTRIAL DIVISION
Box 45144, Airport Station
Los Angeles 45, California

Newly Developed Greer Helicopter Test Machine

Greer's experienced test and maintenance engineers tackled the problem of helicopter servicing, and have come up with the answer...*the new Greer Servo Hydraulic Test Stand!*

This new test unit simulates conditions met in actual flight, and accurately measures the performance and dependability of helicopter servos, dampers, and other hydraulic components.

Installed in New York Airways' test laboratory at LaGuardia Airport, this new Greer Tester brings added safety and assurance to helicopter air service.

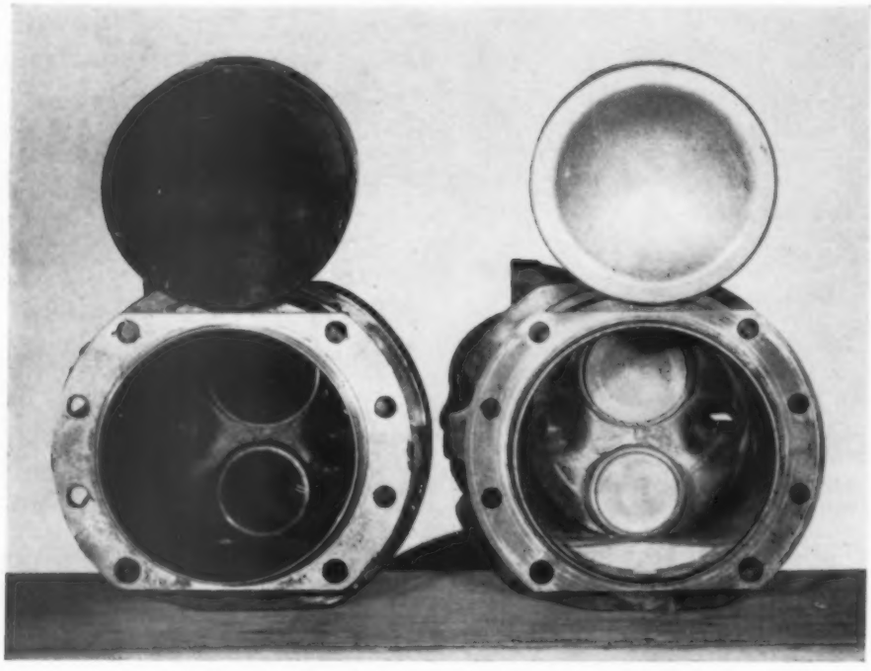
GREER'S SERVO HYDRAULIC TESTER permits simultaneous testing of the helicopter's main and emergency servos at 1500 and 500 psi respectively. A force of 180 lbs. may be applied in the damper test to provide an accurate check of rate of travel.

The complete test stand assembly consists of an all-steel cabinet that houses all hydraulic lines, gauges, ports, reservoir, and mounting fixtures for the test component, plus a portable power pack that supplies the necessary energy to circulate oil throughout the stand.

For complete details, ask for specifications folder on Greer Servo Hydraulic Test Stand, Z-691.

Designers and Makers of Test Equipment for All Systems of All Aircraft

GREER HYDRAULICS INC.
International Airport • Jamaica 30, New York
Chicago, Dayton, Detroit, and North Hollywood
Representatives in all principal cities and abroad



These cylinders show how the Aero Power cleaner does its job. They were removed from an engine after the carbon had been blasted out.

BLAST THAT CARBON

(Continued from page 46)

line into the lower plug hole. Opening the valve to 60 pounds pressure, he went to work blasting inside the cylinder through the top plug hole very much like a dentist spraying the inside of your mouth with a pressure hose. About eight minutes of the ricochet action of the non-corrosive walnut hull particles throughly loosened the carbon deposits which were simultaneously blown out of the cylinder through the outlet hose attached to the lower spark plug port and returned to a disposable filler bag contained within the machine for properly handling the deadly poisonous residue.

He successively treated each cylinder for eight to ten minutes. A close inspection with the light revealed the treatment had definitely removed the carbon from the cylinders and valve heads.

Walnut hull particles are used as the cleaning agent because they are sharply pointed and very hard. Yet they are softer than aluminum and attack only the unwanted deposits inside the combustion chamber. While the air pressure is so strong there's no chance of any of the hulls remaining in the cylinder, should some be inadvertently left, they would burn instantaneously, as soon as the engine was fired up.

Our 145 Continental required 3 or 4 pounds of cleaning agent. The R-985 uses about 5 pounds. Pierce says the cleaner is actually more effective with the higher compression engines.

The treatment impressively eliminated our engine's roughness. We also noted a definite pickup in rpm. in the neighborhood of 75 to 100. While we have not put enough hours on the cleaned engine for a real test, we're convinced we're getting better fuel economy. But the smoothness is what we like.

The distributor makes other claims which certainly are acceptable to us after the amazing difference in our own engine. These include greatly reduced spark plug fouling; reduced operating temperatures; reduced wear and tear (and consequently reduction in parts replacement at overhaul); and reduction in detonation and pre-ignition (other than that caused by maladjustments).

We read some unsolicited letters from two major helicopter companies and several well-known dusters. They are unanimous in praise of the system and have adopted it permanently. As for us, we're going to include the service every time we go in for a 100-hour check. It's that good.

The cleaner will probably become standard equipment in all shops doing any volume of maintenance on private, industrial or agricultural airplanes. Fleet owners doing their own maintenance will also find it a valuable piece of equipment. Once the commercial operator gets a few customers as bellwethers, the cleaner should pay for itself in a matter of weeks. ★ ★ ★

AERO COMMANDER

(Continued from page 44)

of its kind among 190 Commanders produced to date, left the factory last month on a flyaway delivery which will take it across the North Atlantic, Europe and North Africa to Southwest Arabia where the kingdom of Yemen is located. It will be based at Taiz.

Two large chemical tanks carrying 1,200 lbs. or more of poison and special booms carrying six venturi spray ejectors were designed for the Commander by Red Burnum of Arlington, Texas. The special equipment can be installed or removed in less than an hour for quick conversion of the airplane from one flying role to another. The use of venturi spray outlets eliminates the need for pumps or auxiliary mechanisms of any kind. The flow of air through the venturis creates a suction which draws liquid chemicals from the cabin tanks. A manual control lever in the cockpit operates a cable release with which the pilot can select any desired degree of fog from the sprays. Burnum has manufactured and installed hundreds of the venturis on agricultural aircraft in recent years.

Dan Rundstrom, a Swede, took delivery of the Yemen Commander. At New York, he was joined by a Fleetway ferry service crew of Pilot Coburn Webb and Navigator Tex Sessoms for the trans-Atlantic crossing. Rundstrom said the airplane will be

PRECISION . . .

In the Rebuilding of Aircraft Engines and Engine Accessories Is Essential to a Good Reputation. Our Customers Have Proven the Reliability of Engines and Accessories Rebuilt by . . .

PRECISION AEROMOTIVE
CORPORATION

MUNICIPAL AIRPORT — MI-lby-6636 — HOUSTON 17, TEXAS

FIRST BEECHCRAFT TWIN-BONANZA FLIGHT ACROSS NORTH ATLANTIC OCEAN was made recently by the Fleetway ferry crew shown above with the airplane, which was delivered to a Swiss charter outfit, Transair. Pilot Charles Carpenter (left) and Navigator Tex Sessoms, shown with emergency gear, reported to FLIGHT MAGAZINE they covered 4,750 nautical miles from Wichita to London in 28 hrs., 45 mins. air time to average 152 knots (175 mph.), using economical cruise power for 22-gph. fuel consumption and 168-mph. true air speed. Their 196-gal. fuel supply included a 60-gal. auxiliary tank. From Idlewild, N. Y., stops were at Montreal (218 nm.); Goose Bay (720 nm.); BW-1, Greenland (703 nm.); Keflavik, Iceland (672 nm.) and Prestwick, Scotland (752 nm.). Airplane was B-50 Twin-Bonanza with two 260-hp. Lycomings. —(Fleetway Photo.)

operated in Yemen from airports and improvised landing strips ranging from sea level to 7,000 ft. above sea level and in tropical temperatures.

The Yemen dual-purpose airplane is the sixth Aero Commander to be flown across the Atlantic during deliveries. The route is via airways across Labrador, Greenland, Iceland and Scotland.

★ ★ ★

NEW CESSNA 170

(Continued from page 48)

binations are incorporated as standard equipment. A Welsh green exterior with rust and tan interior is one combination and the other offers a Syria red with blue and gray interior.

The new Model 170 has a shock-mounted, non-glare instrument panel with recessed mountings provided in the panel for those who want to install special equipment and additional radios. For example, eight additional instruments, plus two radios, can be added without loss of map compartment space.

FACTORY DATA

1955 Cessna Model 170

Engine: Continental C-145-2, 145 hp.

Top Spd., mph.	**Over 140**
Cruising Spd., mph.	**Over 120**
Rate of Climb, fpm.	**690**
Service Clng., ft.	**15,500**
Fuel Cap., gals.	**42**
Cr. Range, hrs.	**Over 4.5**
Gross Wt., lbs.	**2,200**
Empty Wt., lbs.	**1,205**
Useful Ld., lbs.	**995**
Span, ft.	**36**
Length, ft.	**25**
Wing Area, sq. ft.	**175**
Wing Loading, lbs./sq. ft.	**12.6**
Power Loading, lbs./hp.	**15.2**

A Few Reasons Why AEROTRON Is A Leader In Its Field . . . .

. . . . **Area distributors for Collins, Flite-tronics, Narco.**
. . . . **Approved radio repair station (No. 3668) Class I and 2.**
. . . . **Full insurance for aircraft in our hangar.**
. . . . **Hangar space sufficient for DC-3 equipment.**
. . . . **Specialists in custom radio installations.**
. . . . **FCC and CAA licensed technicians.**
. . . . **Complete radio overhaul and repair facilities.**

Hangar 12
P. O. Box 8442

AEROTRON RADIO CO.
Tulsa, Oklahoma
Municipal Airport

Telephone
8-1507

with the

TEMPCAL

TEST OVER-HEAT DETECTORS and WING ANTI-ICE SYSTEMS . . . RIGHT ON THE PLANE!

The TEMPCAL checks thermal switch and individual thermocouple ACCURACY.

TEMPCAL *functionally tests* thermal switches with their fire detection and anti-ice systems at their *operating temperatures* right on the aircraft . . . and its relay circuit makes it possible to check *switches only* on or off the plane. Additionally, using a selected part of the TEMPCAL circuit, cylinder head temperature thermocouples and their circuits to the flight deck instrument can be checked.

ACCURACY—TEMPCAL Tester temperature readings are made on a highly accurate potentiometer; guaranteed accuracy is ±5°F with temperatures ranging from 0° to 800°F. Heater probes used for cylinder head thermocouples are guaranteed accurate to ±4°C at 0° to 300°C operating temperatures.

FASTER MAINTENANCE CHECKS—It is no longer necessary to take thermal switches to the "lab" for testing. TEMPCAL probes reach a temperature of 800°F in about 8 minutes for quick maintenance checks *on the aircraft.*

The production or maintenance engineer, pilot *and cost accountant* will readily realize the savings and safety factors resulting from TEMPCAL use. We invite inquiries concerning the TEMPCAL (as well as the JETCAL . . . . . for jet engine EGT system accuracy) *and will be glad to have our engineering department help solve your heat problems.*

b&h INSTRUMENT

B & H INSTRUMENT
Company, Inc.
1009 Norwood
FORT WORTH 7, TEXAS

AIR REPORT

(Continued from page 12)

sell at $13,950. Details had not been completed at press time.

BUSINESS PLANES FLEW MORE HOURS THAN ALL SCHEDULED AIRLINES, both domestic and international, during 1953, according to a CAA survey. Representing a 13 per cent increase over 1952, last year's business flying amounted to 3,626,000 hrs., or 430,000 hrs. more than the revenue hours flown by all the scheduled airlines combined. Pleasure flying increased for the first time since 1949, the 1953 total being 1,846,000 hrs. as compared to 1,629,000 hrs. for 1952. Patrol, survey and other industrial flying increased 11 per cent and totaled 353,000 hrs., and agricultural flying such as dusting, spraying, seeding and air cropping totaled 722,000 hrs., a small increase. Instructional flying continued to decline, dropping 17 per cent to total 1,248,000 hrs. An 18 per cent drop-off was shown in passenger and cargo transportation for hire excluding military contract flying and scheduled airline activity but including irregular air carrier operations, the total being 574,000 hrs.

NEW BENDIX ECLIPSE PIONEER TUBELESS PB-20 AUTOPILOT, which uses transistors entirely instead of tubes, made its first flight last May but was not announced until last month due to military considerations.

SERVICE GUIDE FOR FLIERS —

WHERE to STOP

IN SAN ANTONIO . . . IT'S ALAMO AIR LINE SERVICES

On San Antonio Municipal Airport transient pilots who want the best in prompt and efficient service always stop with Alamo Air Line Services, Inc.

Texaco Products — Storage — Tie-Down
Next time you're down our way, drop in!
Free transportation to and from Terminal Bldg.
24-Hour Charter Service Telephone Travis 2649

Flying's Swell at the FLYING L

An adventure in real Western life for all the family . . . Superb food . . . Your favorite ranch sports . . . Cozy-comfort guest suites. Located at Bandera, 48 miles West of San Antonio.

WHAT ?

GRUMMAN SUPER WIDGEON
by McKinnon-Hickman
Take-off 700' land, 10 seconds water—Cruise 160 mph. on 65% power—True Single Engine Operation — Comfortable — Versatile — Economical. Immediate Delivery.
Kits also available or we will convert your Widgeon at Portland, Oregon or at New York in one month's time.
Write for Brochure.
WELSCH AVIATION CO.
60 East 42nd Street, Suite 729
New York 17, New York Murray Hill 7-5884

ENGINE WORKS
Lambert Field St. Louis, Mo.
Furnishes engines and overhauls to:

Grumman Aircraft	Coca-Cola
Northrop Aircraft	Falstaff
International Harvester	T. V. A.
Budweiser	Monsanto
U. S. Engineers	Mather Iron

and over 100 other business DC-3, D18S, Ladestars R1830-92, -75, -94, SUPER-92, R985, R1820.

LAKE HAMILTON—HOT SPRINGS, ARKANSAS. 17 beautiful 100 ft. by 400 ft. lake front lots. 2,600 ft. private landing strip to be constructed in rear to be owned and shared in common by lot owners. High elevation—commanding view. $3,000 each. 25% down—balance in five equal annual payments. Contact Ralph Disheroon, Manager, Hot Springs Municipal Airport, OR Jess Kimball, Spa Flying Service.

Executive Aircraft
Complete Services and Sales
DC-3 Lodestar D18S

Inc., of ST. LOUIS **REMMERT-WERNER** Inc., of TOLEDO

WHERE

EXECUTIVE TRANSPORT AIRCRAFT
DOUGLAS, LOCKHEED, BEECH, GRUMMAN, and CURTISS aircraft for sale. **For top value executive aircraft** call or write ATLANTIC AVIATION CORP., P. O. Box 146, Hasbrouck Heights, New Jersey. HA8-1740. Complete **aircraft maintenance** facilities at Teterboro, New Jersey, and Logan Airport, Boston.

SUPER-92

Over 200 mph. for your DC-3
CAA approved R1830-**Super-92** engines allow 700 HP. normal cruise, better single engine —lower fuel and maintenance mileage costs with 20,000 extra miles between changes, with same overhaul intervals and costs as -92. Fully interchangeable with -92 —same weight, mounts, cowl, lines, etc. Proven by thousands of hours of practical executive operation.
800 Hour Guarantee

ENGINE WORKS
Lambert Field St. Louis, Mo.

Pratt & Whitney	Wright
Sale	Overhaul
Exchange	

REMMERT-WERNER, Inc.
Lambert Field St. Louis, Mo.
Offers Your Choice of

1 DAY	2 DAY	3 DAY
100-hour INSPECTIONS	or	100-hour OVERHAULS
BEECHCRAFT	for DC-3	LODESTAR

MULTI-ENGINE AIRCRAFT
For complete market reports of available Beech, Convair, Curtiss, Douglas, Grumman, Lockheed or other multi-engine aircraft, write or call William C. Wold Associates, 516 5th Ave., New York 36, N. Y., Telephone Murray Hill 7-2050.

HOW MUCH $

We Buy DC-3 and C-47
— also components, fuselages, center sections. Prefer runout or needing work, airline, passenger, or cargo, Pratt & Whitney or Wright. State price, time, quantity, type engines.
We are not brokers
Remmert-Werner, Lambert Field St. Louis, Mo.

IN DALLAS IT'S
Del-tex AVIATION INC.
Cessna
Lear
NARCO
HIGHLAND PARK & LOVE FIELD

NAVCO INC.
Lambert Field
St. Louis, Mo.
TErryhill 5-1511
Has all Parts and Supplies for Executive DC-3 LODESTAR BEECH
Airframe Engines Radios
A.R.C. Bendix Collins Lear Sperry Wilcox
P&W Continental Wright Goodrich Goodyear

AVIATION EMPLOYMENT
Confidential Reports on best paying jobs and careers with airlines, feederlines, aircraft factories, corporations, crop dusters, etc. Pilots, mechanics, all aviation specialities. Experienced and unskilled. Foreign and American. Complete satisfaction guaranteed. Only $2.00. (Airmail $2.25). RESEARCH SERVICES, Box 2904-F, St. Louis 17, Mo.

MAN BEHIND THE C-119

Berlin or Bombay . . . Nome or New Guinea . . . wherever the *Flying Boxcar* is based, there's a Fairchild field representative on the job. These men and the versatile military air transports they tend are serving all over the world, in every type of climate, under the most difficult operating conditions.

As Fairchild trouble-shooters, these expertly trained technicians work closely with U. S. Air Force and Navy engineering officers and men, keeping the Fairchild C-119 operating at maximum efficiency.

Fairchild is proud of these men, the combat-proven *Flying Boxcar*, and the important part both play in the defense of free men everywhere.

...ulist to fly ...U. S. Air Force

ENGINE AND AIRPLANE CORPORATION

FAIRCHILD

Aircraft Division

HAGERSTOWN, MARYLAND

American Helicopter Division, Manhattan Beach, Calif.
Engine Division, Farmingdale, N. Y.
Guided Missiles Division, Wyandanch, N. Y.
Kinetics Division, New York, N. Y.
Speed Control Division, St. Augustine, Fla.
Stratos Division, Bay Shore, N. Y.

The New *Riley Twin 55* Is Going Into Production!

OUR NEW RILEY TWIN 55 OFFERS UNPARALLELED PERFORMANCE AND ECONOMY. IT IS THE FINEST PRODUCT IN THE AVIATION WORLD TODAY.

- More Power from new, lightweight, super-efficient engines
- More Speed
- More Climb
- More Payload
- Higher SE Ceiling
- More Fuel
- More Comfort, New Seating
- More Range
- New, Large Outside Baggage Door
- Shorter Take-off
- New Standard Features

Write for new literature and specific data

Riley Twin
AIRCRAFT SALES

Office at Love Field (in Mustang Aviation Building),
Telephone ELmhurst-5687 P. O. Box 7004, Dallas, Texas